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AN EPITOME OF THE SYNTHETIC PHILOSOPHY.

AN EPITOME

OF

The Synthetic Philosophy

BY

F. HOWARD COLLINS.

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WITH A PREFACE

BY

HERBERT SPENCER.

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COMPILER'S PREFACE.

THE object of this volume is to give in a condensed form the general principles of Mr. Herbert Spencer's Philosophy as far as possible in his original words. In order to carry out this intention each section (§) has been reduced, with but few exceptions, to one tenth; the five thousand and more pages of the original being thus represented by a little over five hundred. The Epitome consequently represents *The Synthetic Philosophy* as it would be seen through a diminishing glass: the original proportion holding between all its varied parts.

Should this volume lead the general reader to a better acquaintance with Mr. Spencer's own works, I shall feel amply repaid for my labour.

My warmest thanks are due to Mr. Spencer for his invaluable preface; and also to Miss Beatrice Potter, and Mr. Henry R. Tedder, F.S.A., the able and accomplished secretary and librarian of the Athenæum Club, for their valuable suggestions while the work has been in progress.

F. H. C.

CHURCHFIELD,
EDGBASTON.

PREFACE.

After spending several years in the self-imposed task of making indexes to my books, for the efficient execution of which I am much indebted to him, Mr. F. Howard Collins volunteered to undertake a far larger and more difficult task. He expressed the wish to make an epitome of *The Synthetic Philosophy*; and asked me whether, if an epitome were satisfactorily made, I would agree to the publication of it. After some consideration I assented.

Before starting on a journey through an unknown region, study of a map is desirable; and a clear preliminary conception is more readily obtained from a small outline-map than from a large one full of details. In like manner, before commencing a series of volumes which, though all pervaded by certain organizing ideas, deal with various subjects, an introductory view presenting these organizing ideas in smaller space and freed from elaboration, can scarcely fail to facilitate comprehension. The epitome which Mr. Collins has prepared in the course of five years fulfils this purpose.

Ill-health has prevented me from reading it through; but I have read portions taken at random here and

there, and have found them very well done. The condensed statements are at once correct and clear. Indeed I have been somewhat surprised that it has proved possible to put so much into so small a space without sacrifice of intelligibility. Of course, divested as they are of all illustrative matter, these abstracts of chapters and sections do not suffice to give vivid and definite conceptions; but the undeveloped conceptions they give prepare the way for those developed ones to be obtained by perusal of the chapters and sections themselves.

To write an introduction to an introduction will be thought strange; but the epitome in one volume which Mr. Collins has made of matter occupying ten volumes may itself be epitomized in three pages—of course in a series of highly abstract propositions. Some eighteen or more years ago, an American friend requested me, with a view to a certain use which he named, to furnish him with a succinct statement of the cardinal principles developed in the successive works I had published and in those I was intending to publish. This statement, which I wrote out for him, and which has since made its appearance in England in a form giving it but little currency, I here reproduce to prepare the way for Mr. Collins' epitome.

"1. Throughout the universe in general and in detail, there is an unceasing redistribution of matter and motion.

2. This redistribution constitutes evolution where there is a predominant integration of matter and dissipation of

motion, and constitutes dissolution where there is a predominant absorption of motion and disintegration of matter.

3. Evolution is simple when the process of integration, or the formation of a coherent aggregate, proceeds uncomplicated by other processes.

4. Evolution is compound when, along with this primary change from an incoherent to a coherent state, there go on secondary changes due to differences in the circumstances of the different parts of the aggregate.

5. These secondary changes constitute a transformation of the homogeneous into the heterogeneous—a transformation which, like the first, is exhibited in the universe as a whole and in all (or nearly all) its details: in the aggregate of stars and nebulæ; in the planetary system; in the earth as an inorganic mass; in each organism, vegetal or animal (von Baer's law); in the aggregate of organisms throughout geologic time; in the mind; in society; in all products of social activity.

6. The process of integration, acting locally as well as generally, combines with the process of differentiation to render this change not simply from homogeneity to heterogeneity, but from an indefinite homogeneity to a definite heterogeneity; and this trait of increasing definiteness, which accompanies the trait of increasing heterogeneity, is, like it, exhibited in the totality of things and in all its divisions and sub-divisions down to the minutest.

7. Along with this redistribution of the matter composing any evolving aggregate, there goes on a redistribution of the retained motion of its components in relation to one another: this also becomes, step by step, more definitely heterogeneous.

8. In the absence of a homogeneity that is infinite and absolute, that redistribution of which evolution is one phase, is inevitable. The causes which necessitate it are these:—

9. The instability of the homogeneous, which is con-

sequent upon the different exposures of the different parts of any limited aggregate to incident forces. The transformations hence resulting are complicated by—

10. The multiplication of effects. Every mass and part of a mass on which a force falls, sub-divides and differentiates that force, which thereupon proceeds to work a variety of changes; and each of these becomes the parent of similarly-multiplying changes: the multiplication of them becoming greater in proportion as the aggregate becomes more heterogeneous. And these two causes of increasing differentiations are furthered by—

11. Segregation, which is a process tending ever to separate unlike units and to bring together like units—so serving continually to sharpen, or make definite, differentiations otherwise caused.

12. Equilibration is the final result of these transformations which an evolving aggregate undergoes. The changes go on until there is reached an equilibrium between the forces which all parts of the aggregate are exposed to and the forces these parts oppose to them. Equilibration may pass through a transition stage of balanced motions (as in a planetary system) or of balanced functions (as in a living body) on the way to ultimate equilibrium; but the state of rest in inorganic bodies, or death in organic bodies, is the necessary limit of the changes constituting evolution.

13. Dissolution is the counter-change which sooner or later every evolved aggregate undergoes. Remaining exposed to surrounding forces that are unequilibrated, each aggregate is ever liable to be dissipated by the increase, gradual or sudden, of its contained motion; and its dissipation, quickly undergone by bodies lately animate, and slowly undergone by inanimate masses, remains to be undergone at an indefinitely remote period by each planetary and stellar mass, which, since an indefinitely distant period in the past, has been slowly evolving: the cycle of its transformations being thus completed.

14. This rhythm of evolution and dissolution, completing

itself during short periods in small aggregates, and in the vast aggregates distributed through space completing itself in periods which are immeasurable by human thought, is, so far as we can see, universal and eternal—each alternating phase of the process predominating now in this region of space and now in that, as local conditions determine.

15. All these phenomena, from their great features down to their minutest details, are necessary results of the persistence of force, under its forms of matter and motion. Given these as distributed through space, and their quantities being unchangeable, either by increase or decrease, there inevitably result the continuous redistributions distinguishable as evolution and dissolution, as well as all those special traits above enumerated.

16. That which persists unchanging in quantity, but ever changing in form, under these sensible appearances which the universe presents to us, transcends human knowledge and conception—is an unknown and unknowable power, which we are obliged to recognize as without limit in space and without beginning or end in time."

Returning to the epitome made by Mr. Collins in the volume herewith issued, I will add only that it cannot with advantage be read in large portions at once. A long series of abstract propositions, taken without concrete illustrations, is likely to prove wearisome, and to leave but faint impressions. It will be better for the student to read one section only at a time, and himself to seek illustrative cases before proceeding to the next.

HERBERT SPENCER.

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PART I.

"FIRST PRINCIPLES."

CHAPTER I.

THE UNKNOWABLE.

"Carrying a step further the doctrine put into shape by Hamilton and Mansel; pointing out the various directions in which Science leads to the same conclusions; and showing that in this united belief in an Absolute that transcends not only human knowledge but human conception, lies the only possible reconciliation of Science and Religion."

I. RELIGION AND SCIENCE.

1. However wrong many human beliefs appear we may infer that they germinated from actual experiences, and that they originally contained, and perhaps still contain, some small amount of truth. We may assume this more especially of those beliefs which are nearly or quite universal.

2. The varied opinions which have been held from age to age, from the most primitive to those of modern and civilized communities, as to the origin, authority, and functions of government, may serve to show that between the most opposite beliefs there is usually something in common. We cannot say that some one alone of all these varied beliefs—from the notion of savages that a monarch is a god, to the modern view that government is only the administrator of the moral principles underlying social life—is wholly right and all the others wholly wrong. A careful examination will show that each one of these beliefs contains some truth; they all exhibit the principle of a subordination of individual actions to social requirements; although differing widely as to the origin, motive, and extent of the ruling power, there is on this one point complete uniformity. A postulate thus unconsciously involved by numerous bodies

of men, otherwise diverging in countless ways and degrees, may rank next in certainty to the postulates of exact science. Our method to find this postulate is:—To compare all opinions of one genus; to set aside the special and concrete elements in which they disagree; and to find for the remainder that abstract expression which holds true throughout its divergent modifications.

3. A candid acceptance of this general principle, and an adoption of the course it indicates, will greatly aid us in dealing with the chronic antagonism between Religion and Science. We shall not regard some men's judgments as wholly good, and others as wholly bad; but shall rather conclude that none are completely right and none are completely wrong.

4. Thus, however untenable may be any or all the existing religious creeds, however irrational the arguments set forth in their defence, we must not ignore the verity which in all likelihood lies hidden within them. The general probability that widely-spread beliefs are not absolutely baseless, is in this case enforced by a further probability due to the omnipresence of the beliefs. In the existence of a religious sentiment, whatever be its origin, we have a second fact of great significance. And we find a third fact of like implication, when we perceive that, as knowledge cannot monopolize consciousness, it must always continue possible for the mind to dwell upon that which transcends knowledge. Hence, there must always be a place for something of the nature of Religion. Since Religion under all its forms is distinguished from everything else in that its subject matter is that which passes the sphere of experience.

5. What is Science? To see the absurdity of the prejudice against it, we need only remark that Science is simply a higher development of common-knowledge; and that if Science is repudiated, all knowledge must be repudiated along with it. It is nowhere possible to say where the dicta of common sense end and the generalizations of Science begin. The daily verification of its predictions; the growth

and firm establishment of such of its larger divisions as mathematics, physics, and astronomy; and the never-ceasing triumphs of those arts which Science guides; are conclusive testimony as to its *truth*.

6. If both Religion and Science have bases in the reality of things, then between them there must be a fundamental harmony. There cannot be two orders of truth in absolute and everlasting opposition. To understand how Science and Religion express opposite sides of the same fact—the one its near or visible side, and the other its remote or invisible side—becomes our problem. How to find this harmony—how to reconcile the two, is the question to be answered. We have to seek out that ultimate truth which both will avow with absolute sincerity.

7. We cannot but conclude that the most abstract truth contained in Religion and the most abstract truth contained in Science must be the one in which the two coalesce. It must be the ultimate fact in our intelligence.

8. Here it may be well to bespeak a little patience; as, to those unacquainted with metaphysics, the three following divisions may prove somewhat difficult to follow. The greatness of the question at issue would justify even a heavier tax upon the reader's attention.

II. ULTIMATE RELIGIOUS IDEAS.

9. We must say of conceptions in general, that they are complete only when the attributes of the object conceived are of such number and kind that they can be represented in consciousness so nearly at the same time as to seem all present together; that when the size, complexity, or discreteness of the object conceived becomes very great, only a small portion of its attributes can be thought of at once, and the conception formed of it thus becomes so inadequate as to be a mere symbol; that nevertheless such symbolic conceptions, which are indispensable in general thinking, are legitimate, provided that by some cumulative or indirect

process of thought, or by the fulfilment of predictions based on them, we can assure ourselves that they stand for actualities; but that when our symbolic conceptions are such that no cumulative or indirect processes of thought can enable us to ascertain that there are corresponding actualities, nor any predictions be made whose fulfilment can prove this, then they are altogether vicious and illusive, and in no way distinguishable from pure fictions.

10. The bearing of this general truth upon the problem of the Universe, is to show not only that no current hypothesis regarding it is tenable, but also that no tenable hypothesis can be framed.

11. Respecting the origin of the Universe three verbally intelligible suppositions may be made. We may assert that it is self-existent; or that it is self-created; or that it is created by an external agency. Is any one of these suppositions conceivable in the true sense of the word? No. For experiment proves that the elements of these hypotheses cannot even be put together in consciousness; and we can entertain them only as we entertain such pseud-ideas as a square fluid and a moral substance—only by abstaining from the endeavour to render them into actual thoughts. Or, reverting to our original mode of statement, we may say that they severally involve symbolic conceptions of the illegitimate and illusive kind. It is impossible to avoid making the assumption of self-existence somewhere; and whether that assumption be made nakedly, or under complicated disguises, it is equally vicious, equally unthinkable. For our conception of self-existence can be formed only by joining with it the notion of unlimited duration through past time. And as unlimited duration is inconceivable, all those formal ideas into which it enters are inconceivable; and indeed, if such an expression is allowable, are the more inconceivable in proportion as the other elements of the ideas are indefinite. So that in fact, impossible as it is to think of the actual universe as self-existing, we do but multiply impossibilities of thought by every attempt we make to explain its existence.

12. If from the origin of the Universe we turn to its nature, the same difficulties rise up before us under new aspects. The objects and actions surrounding us, not less than the phenomena of our own consciousness, compel us to ask a cause: commit us to the hypothesis of a First Cause; which we have no alternative but to regard as Infinite and Absolute. The mutual contradictions involved in this hypothesis may be shown from Dean Mansel's *Limits of Religious Thought*, where he summarizes them in the following words:—

13. "The conception of the Absolute and Infinite, from whatever side we view it, appears encompassed with contradictions. There is a contradiction in supposing such an object to exist, whether alone or in conjunction with others; and there is a contradiction in supposing it not to exist. There is a contradiction in conceiving it as one; and there is a contradiction in conceiving it as many. There is a contradiction in conceiving it as personal; and there is a contradiction in conceiving it as impersonal. It cannot without contradiction be represented as active; nor, without equal contradiction, be represented as inactive. It cannot be conceived as the sum of all existence; nor yet can it be conceived as a part only of that sum." (1858. p. 58-9.)

14. And now what is the bearing of these results on the question before us? It is that Religions, diametrically opposed in their overt dogmas, are yet perfectly at one in the tacit conviction that the existence of the world with all it contains and all which surrounds it, is a mystery ever pressing for interpretation. But an examination of the solutions they severally propound, shows them to be uniformly invalid. And thus the mystery which all religions recognize, turns out to be a far more transcendent mystery than any of them suspect—not a relative, but an absolute mystery. If Religion and Science are to be reconciled, the basis of reconciliation must be this deepest, widest, and most certain of all facts—that the Power which the Universe manifests to us is utterly inscrutable.

III. ULTIMATE SCIENTIFIC IDEAS.

15. What are Space and Time? Two hypotheses are current respecting them: the one that they are objective, and the other that they are subjective—the one that they are external to, and independent of, ourselves, the other that they are internal, and appertain to our own consciousness. But we cannot conceive Space and Time as entities, and we are equally disabled from conceiving them as either the attributes of entities or as non-entities. We are compelled to think of them as existing; and yet cannot bring them within those conditions under which existences are represented in thought. To assert that they are subjective realities is merely to multiply irrationalities. It results therefore that Space and Time are wholly incomprehensible.

16. Matter is either infinitely divisible, or it is not: no third possibility can be named. Which of the alternatives shall we accept? If we say that Matter is infinitely divisible, we commit ourselves to a supposition not realizable in thought. For really to conceive the infinite divisibility of Matter, is mentally to follow out the divisions to infinity; and to do this would require infinite time. On the other hand, to assert that Matter is not infinitely divisible, is to assert that it is reducible to parts which no conceivable power can divide; and this verbal supposition can no more be represented in thought than the other. Matter then, in its ultimate nature, is as absolutely incomprehensible as Space and Time. Frame what suppositions we may, we find on tracing out their implications that they leave us nothing but a choice between opposite absurdities.

17. Absolute Motion cannot even be imagined, much less known. That a man standing still is moving 1,000 miles per hour East, and 67,000 per hour West, may serve to show how illusive Motion is. Motion as taking place apart from those limitations of space which we habitually associate with it, is totally unthinkable. As also is the transfer

of Motion—the ability of a moving thing to generate movement in a thing that is stationary. Similarly the change from Rest to Motion, or Motion to Rest, is a transition that cannot be represented in thought. Neither when considered in connexion with Space, Matter, or Rest, is Motion truly cognizable. All efforts to understand its essential nature do but bring us to alternative impossibilities of thought.

18. It scarcely needs to point out that the weight of a chair produces in us various feelings according as we support it by a single finger, or the whole hand, or the leg; and hence to argue that as it cannot be like all these sensations there is no reason to believe it like any. It suffices to remark that since the force as known to us is an affection of consciousness, we cannot conceive the force existing in the chair under the same form without endowing the chair with consciousness. So that it is absurd to think of Force as in itself like our sensation of it, and yet necessary so to think of it if we realize it in consciousness at all. It is impossible to form any idea of Force in itself, or to comprehend its mode of exercise.

19. Let us now turn from the outer to the inner world; from the agencies to which we ascribe our subjective modifications, to the subjective modifications themselves. It is beyond question that our states of consciousness occur in succession. Is this chain of states of consciousness infinite or finite? We cannot say. For, while we are unable either to believe or to conceive that the duration of consciousness is infinite, we are equally unable either to know it as finite, or to conceive it as finite.

20. Nor do we meet with any greater success when, instead of the extent of consciousness, we consider its substance. The question—What is this that thinks? admits of no better solution than the question to which we have just found none but inconceivable answers. Though the personality of which each is conscious, and of which the existence is to each a fact beyond all others the most certain,

yet it is a thing which cannot truly be known at all; knowledge of it is forbidden by the very nature of thought.

21. Ultimate Scientific Ideas, then, are all representative of realities that cannot be comprehended. The explanation of that which is explicable, does but bring out into greater clearness the inexplicableness of that which remains behind.

IV. THE RELATIVITY OF ALL KNOWLEDGE.

22. The same conclusion is thus arrived at, from whichever point we set out. It yet remains to show how this belief—that the reality existing behind all appearances is, and must ever be, unknown—may be established rationally, as well as empirically.

23. From the fact that the successively deeper interpretations of nature which constitute advancing knowledge, are merely successive inclusions of special truths in general truths, and of general truths in truths still more general; it obviously follows that the most general truth, not admitting of inclusion in any other, does not admit of interpretation. Manifestly, as the *most* general cognition at which we arrive cannot be reduced to a *more* general one, it cannot be understood. Of necessity, therefore, explanation must eventually bring us down to the inexplicable. The deepest truth which we can get at, must be unaccountable. Comprehension must become something other than comprehension, before the ultimate fact can be comprehended.

24. The inference which we thus find forced upon us when we analyze the product of thought, as exhibited objectively in scientific generalizations, is equally forced upon us by an analysis of the process of thought, as exhibited subjectively in consciousness. The First Cause, the Infinite, the Absolute, to be known at all, must be thought of, as of this or that kind. Can it be like in kind to anything of which we have sensible experience? Obviously not. Between the creating and the created, there must be a distinction transcending any of the distinctions existing between different divisions

of the created. Is it then that the Actual, though unthinkable by classification with the Apparent, is thinkable by classification with itself? This supposition is equally absurd with the other. It implies the plurality of the First Cause, the Infinite, the Absolute; and this implication is self-contradictory. There cannot be more than one First Cause; seeing that the existence of more than one would involve the existence of something necessitating more than one, which something would be the true First Cause. How self-destructive is the assumption of two or more Infinites, is manifest on remembering that such Infinites, by limiting each other, would become finite. And similarly, an Absolute which existed not alone but along with other Absolutes, would no longer be an absolute but a relative. The Unconditioned therefore, as classable neither with any form of the conditioned nor with any other Unconditioned, cannot be classed at all. And to admit that it cannot be known as of such or such kind, is to admit that it is unknowable. Every thought involves *relation, difference, likeness*. Hence we may say that the Unconditioned, as presenting none of these, is trebly unthinkable.

25. Again, the simplest cognition being the establishment of some connexion between subjective states, answering to some connexion between objective agencies; and each successively more complex cognition being the establishment of some more involved connexion of such states, answering to some more involved connexion of such agencies; it is clear that the process, no matter how far it be carried, can never bring within the reach of Intelligence, either the states themselves or the agencies themselves. If every act of knowing is the formation of a relation in consciousness parallel to a relation in the environment, then the relativity of knowledge is self-evident, it becomes indeed a truism. Thinking being the establishment of relations, no thought can ever express more than relations. Deep down in the very nature of Life, the relativity of our knowledge is discernible. The analysis of vital actions in general, leads

not only to the conclusion that things in themselves cannot be known to us; but also to the conclusion that knowledge of them, were it possible, would be useless.

26. There still remains the final question—What must we say concerning that which transcends knowledge? Are we to rest wholly in the consciousness of phenomena?—is the result of inquiry to exclude utterly from our minds everything but the relative? or must we also believe in something beyond the relative? We are obliged to form a positive though vague consciousness of that which transcends distinct consciousness. Our consciousness of the unconditioned being literally the unconditioned consciousness, or raw material of thought to which in thinking we give definite forms, it follows that an ever-present sense of real existence is the very basis of our intelligence. As we can in successive mental acts get rid of all particular conditions and replace them by others, but cannot get rid of that undifferentiated substance of consciousness which is conditioned anew in every thought; there ever remains with us a sense of that which exists persistently and independently of conditions. At the same time that by the laws of thought we are rigorously prevented from forming a conception of absolute existence; we are by the laws of thought equally prevented from ridding ourselves of the consciousness of absolute existence: this consciousness being the obverse of our self-consciousness. And since the only possible measure of relative validity among our beliefs, is the degree of their persistence in opposition to the efforts made to change them, it follows that this which persists at all times, under all circumstances, and cannot cease until consciousness ceases, has the highest validity of any. Briefly, the existence of a Non-Relative is involved in the facts:—that all our knowledge is Relative; that the Relative is itself inconceivable, except as related to a real Non-relative; that unless a real Non-relative or Absolute be postulated, the Relative itself becomes Absolute; and, finally, that the existence of a Non-relative

is involved in the process of thought. Hence our indestructible belief in that actuality.

V. THE RECONCILIATION.

27. We are thus obliged to regard every phenomenon as a manifestation of an unlimited and incomprehensible Power. In this conclusion Religion becomes reconciled with Science. To understand fully how real is the reconciliation thus reached, it will be needful to look at the respective attitudes that Religion and Science have all along maintained towards this conclusion.

28. Of Religion, we must always remember, that amid its many errors and corruptions it has asserted and diffused a supreme verity, that all things are manifestations of a power that transcends our knowledge. From the first, the recognition of this supreme verity, in however imperfect a manner, has been its vital element; and its various defects, once extreme but gradually diminishing, have been so many failures to recognize in full that which it recognized in part. The truly religious element of Religion has always been good; that which has proved untenable in doctrine and vicious in practice, has been its irreligious element; and from this it has been ever undergoing purification.

29. The agent which has effected the purification has been Science. The progress of Science, in grouping particular relations of phenomena under laws, and these special laws under laws more and more general, is of necessity a progress to causes that are more and more abstract—less and less conceivable. Hence the most abstract conception, to which Science is ever slowly approaching, is one that merges into the inconceivable or unthinkable. And so is justified the assertion, that the beliefs which Science has forced upon Religion, have been intrinsically more religious than those which they supplanted. In each phase of its progress, Science has, however, rested content with superficial solutions. And this unscientific characteristic of

Science, has all along been a part cause of its conflict with Religion.

30. We see then that from the first, the faults of both Religion and Science have been the faults of imperfect development. Originally a mere rudiment, each has been growing into a more complete form; the vice of each has in all times been its incompleteness; the disagreements between them have throughout been nothing more than the consequences of their incompleteness; and as they reach their final forms, they come into entire harmony.

31. Some do indeed allege that though the Ultimate Cause of things cannot really be thought of by us as having specified attributes, it is yet incumbent upon us to assert these attributes. That this is not the conclusion here adopted, needs hardly be said. Our duty is to submit ourselves with all humility to the established limits of our intelligence; and not perversely to rebel against them. Very likely we shall always be under the necessity of contemplating the Ultimate Existence as *some* mode of being; that is—of representing it to ourselves in *some* form of thought, however vague. And we shall not err in doing this so long as we treat every notion we thus frame as merely a symbol, utterly without resemblance to that for which it stands. Perpetually to construct ideas requiring the utmost stretch of our faculties, and perpetually to find that such ideas must be abandoned as futile imaginations, may realize to us more fully than any other course, the greatness of that which we vainly strive to grasp. Such efforts and failures may serve to maintain in our minds a due sense of the incommensurable difference between the Conditioned and the Unconditioned.

32. An immense majority will refuse with more or less of indignation, a belief seeming to them so shadowy and indefinite. Having always embodied the Ultimate Cause so far as was needful to its mental realization, they must necessarily resent the substitution of an Ultimate Cause which cannot be mentally realized at all. This resistance

to a change of theological opinion is in a great measure salutary. It is not simply that strong and deep-rooted feelings are necessarily excited to antagonism, and that the highest moral sentiments join in the condemnation of a change which seems to undermine their authority; but it is that a real adaptation exists between an established belief and the natures of those who defend it; and that the tenacity of the defence measures the completeness of the adaptation. Forms of religion, like forms of government, must be fit for those who live under them; and in the one case as in the other, that form which is fittest is that for which there is an instinctive preference. As certainly as a barbarous race needs a harsh terrestrial rule, and habitually shows attachment to a despotism capable of the necessary rigour; so certainly does such a race need a belief in a celestial rule that is similarly harsh, and habitually shows attachment to such a belief. Theological conservatism, like political conservatism, has thus an all-important function. It prevents the constant advance from being too rapid.

33. That our spirit of toleration may be the widest possible, let these three cardinal facts be borne in mind:—

The existence of a fundamental verity under all forms of religion, however degraded.

The concrete elements in which each creed embodies this truth, are relatively though not absolutely, good.

These various beliefs are necessary parts of the constituted order of things; and are needful accompaniments of human life, severally fitted to the societies in which they are indigenous.

34. These admissions do not imply that the current theology should be passively accepted. Though existing religious ideas and institutions have an average adaptation to the characters of the people who live under them; yet, as these characters are ever changing, the adaptation is ever becoming imperfect; and the ideas and institutions need remodelling with a frequency proportionate to the rapidity of the change. Hence, while it is requisite that

free play should be given to conservative thought and action, progressive thought and action must also have free play. Without the agency of both, there cannot be those continual re-adaptations which orderly progress demands.

CHAPTER II.

THE KNOWABLE.

"A statement of the ultimate principles discernible throughout al manifestations of the Absolute—those highest generalizations now being disclosed by Science which are severally true not of one class of phenomena but of *all* classes of phenomena; and which are thus the keys to all classes of phenomena."

I. PHILOSOPHY DEFINED.

35. As with religious beliefs (§ § 1-8), so with the varied beliefs respecting the nature of Philosophy. None of them are wholly false, while the truth is contained in that in which they all agree.

36. Though in the extent of the sphere which they have supposed Philosophy to fill, men have differed and still differ very widely; yet there is a real if unavowed agreement among them in signifying by this term a knowledge which transcends ordinary knowledge. That which remains as the common element in all the varied conceptions of Philosophy, after the elimination of their discordant elements, is—*knowledge of the highest degree of generality.* This is tacitly asserted by the division of Philosophy as a whole into Theological, Physical, Ethical, &c. For that which characterizes the genus of which these are species, must be something more general than that which distinguishes any one species.

37. The truths of Philosophy bear the same relation to the highest scientific truths, that each of these bears to lower scientific truths. As each widest generalization of Science

comprehends and consolidates those narrower ones of its own division; so the generalizations of Philosophy comprehend and consolidate the widest generalizations of Science. It is the final product of that process which begins with a mere colligation of crude observations, goes on establishing propositions that are broader and more separated from particular cases, and ends in universal propositions. In its simplest form:—Knowledge of the lowest kind is *un-unified* knowledge; Science is *partially-unified* knowledge; Philosophy is *completely-unified* knowledge.

38. Two forms of Philosophy, as thus understood, may be distinguished and dealt with separately. General Philosophy where particular truths are used to elucidate the universal truths; and Special Philosophy, where, assuming the universal truths, the particular truths are interpreted by them. The remainder of this chapter will be devoted to the former.

II. THE DATA OF PHILOSOPHY.

39. Every thought involves a whole system of thoughts, and ceases to exist if severed from its various correlatives. As we cannot isolate a single organ of a living body, and deal with it as though it had a life independent of the rest; so, from the organized structure of our cognitions, we cannot cut out one, and proceed as though it had survived the separation. Hence the fundamental intuitions that are essential to the process of thinking, must be temporarily accepted as unquestionable: leaving the assumption of their unquestionableness to be justified by the results.

40. Setting out with these fundamental intuitions provisionally assumed to be congruous with all other dicta of consciousness: the process of proving or disproving the congruity becomes the business of Philosophy; and the complete establishment of the congruity becomes the same thing as the complete unification of knowledge in which Philosophy reaches its goal.

41. What is this datum, or rather, what are these data, which Philosophy cannot do without? It is that congruities and incongruities exist, and are cognizable by us. The permanence of a consciousness of likeness or difference, is our ultimate warrant for asserting the existence of likeness or difference. To say that a given congruity or incongruity exists, is simply our way of saying that we invariably have a consciousness of it along with a consciousness of the compared things. We know nothing more of existence than a continued manifestation.

42. We must recognize not only a fundamental *process*, but also a fundamental *product* of thought. If knowledge is grouping the like and separating the unlike, its unification must specify the antithesis between two ultimate classes of experiences in which all others merge. What are these?

43. Setting out from the conclusion lately reached, that all things known to us are manifestations of the Unknowable; we find these manifestations, considered simply as such, are divisible into two great classes, the *Vivid* and the *Faint*. The former, occurring under the conditions of perception, are originals. The latter, occurring under those of reflection, memory, imagination, or ideation, are copies. The first form with one another a series, or heterogeneous current, that is never broken; and the second also form with one another a parallel series or current that is never broken: or rather, no breakage of either is ever directly known. Between manifestations of the vivid order, the cohesions both longitudinal and transverse, are indissoluble; but those of the faint order are mostly dissoluble with ease. While the members of each series are so coherent with one another that the current cannot be broken, the two currents, running side by side as they do, have but little coherence—the great body of the vivid current is absolutely unmodifiable by the faint, and the faint may become almost separate from the vivid. The conditions under which manifestations of either order occur, themselves belong to that order; but whereas in the faint

order, the conditions are always present; in the vivid order the conditions are often not present, but lie somewhere outside the series. Seven separate characters mark off these two orders of manifestations from one another.

44. Obviously this division is equivalent to that between *object* and *subject*, between *self* and *not-self*. The power that manifests itself in the *faint* series we call the *ego*, while that in the *vivid* we call the *non-ego*. This primordial division of self from not-self, is a cumulative result of persistent consciousnesses of likenesses and differences among manifestations. From the fact that some vivid manifestations have conditions of occurrence existing out of the current of vivid manifestations, we are made vaguely conscious of an indefinitely-extended region of power or being, not merely separate from the current of faint manifestations constituting the *ego*, but lying beyond the current of vivid manifestations constituting the immediately-present portion of the *non-ego*.

45. In brief, our postulates are:—an Unknowable Power; the existence of knowable likenesses and differences among the manifestations of that Power; and a resulting segregation of the manifestations into those of subject and object. In "Ultimate Scientific Ideas" it was shown that nothing is known of certain most general forms of the manifestations of the Unknowable, considered in themselves. As, nevertheless, we must continue to use the words signifying them, it is needful to say what interpretations are to be put on these words.

III. SPACE, TIME, MATTER, MOTION, AND FORCE.

46. Reality, as we think it, being nothing more than *persistence* in consciousness, the result must be the same to us whether that which we perceive be the Unknowable itself, or an effect invariably wrought on us by the Unknowable. The persistent impressions being the persistent results of a persistent cause, are for practical purposes the

same to us as the cause itself; and may be habitually dealt with as its equivalents. Somewhat in the same way that our visual perceptions, though merely symbolic of tactual perceptions, are yet so identified with them that we actually appear to see the solidity and hardness which is but inferred, and thus conceive as objects what are but their signs; so, do we deal with these relative realities as though they were absolutes instead of effects of the absolute. This general conclusion it now remains to interpret specifically, in its application to each of our ultimate scientific ideas.

47. It has been pointed out that *relation* is the universal form of thought (chap. I). Now relations are of two orders—relations of sequence, in which the terms are not reversible, in the abstract, Time; and relations of coexistence, in which they are reversible, in the abstract, Space. Our consciousness of the latter arises from accumulated experiences of *force*, partly our own but chiefly ancestral. All we can assert is, that Space is a relative reality; that our consciousness of this unchanging relative reality implies an absolute reality equally unchanging. And that the relative reality may be unhesitatingly accepted in thought as a valid basis for our reasonings; which, when rightly carried on, will bring us to truths that have a like relative reality—the only truths which concern us or can possibly be known to us. A parallel argument leads to parallel conclusions concerning Time; relative and absolute.

48. Our conception of Matter, reduced to its simplest shape, is that of coexistent positions that offer resistance; as contrasted with our conception of Space, in which the coexistent positions offer no resistance. Thus experiences of *force* underlie the idea of Matter. Such being our cognition of the relative reality, what is to be said of the absolute reality? We can only say that it is some mode of the Unknowable, related to the Matter we know, as cause to effect.

49. The conception of Motion, involves the conceptions

of Space, Time, and Matter, and is therefore elaborated from experiences of *force*. Need it be said that this relative reality answers to some absolute reality?

50. We come then finally to Force, as the ultimate of ultimates. All other modes of consciousness are derivable from experiences of Force; but experiences of Force are not derivable from anything else. Getting rid of all complications, and contemplating pure Force, we are irresistibly compelled by the relativity of our thought, to vaguely conceive some unknown force as the correlative of the known force. Noumenon and phenomenon are here presented in their primordial relation as two sides of the same change, of which we are obliged to regard the last as no less real than the first.

51. An Unknown Cause of the known effects which we call phenomena, likenesses and differences among these known effects, and a segregation of the effects into subject and object—these are the postulates without which we cannot think. Just the same warrant which we have for asserting that subject and object coexist, we have for asserting that the vivid manifestations we call objective, exist under certain constant conditions, that are symbolized by these constant conditions among the manifestations we call subjective.

IV. THE INDESTRUCTIBILITY OF MATTER.

52. Could it be shown that Matter, either in its aggregates or in its units, ever became non-existent, there would be need either to ascertain under what conditions it became non-existent, or else to confess that Science and Philosophy are impossible. For if we had to deal with quantities and weights which were apt to be annihilated, there would be introduced an incalculable element, fatal to all positive conclusions.

53. The belief that Matter can be annihilated readily obtains currency while the power of discrimination is

insufficient to distinguish between vanishing from the range of perception, and vanishing out of space altogether; and also, as long as the power of introspection is insufficient to show that it is impossible to annihilate Matter in thought. Our inability to conceive Matter becoming non-existent, is immediately consequent on the nature of thought. Thought consists in the establishment of relations. There can be no relation established, and therefore no thought framed, when one of the related terms is absent from consciousness. Hence it is impossible to think of something becoming nothing, or nothing something, for the reason that nothing cannot become an object of consciousness. No experimental verification of the truth that Matter is indestructible, is possible without a tacit assumption of it.

54. By the Indestructibility of Matter, we really mean the indestructibility of the *force* with which Matter affects us. As we become conscious of Matter only through that resistance which it opposes to our muscular energy, so do we become conscious of the permanence of Matter only through the permanence of this resistance; either as immediately or as mediately proved to us.

V. THE CONTINUITY OF MOTION.

55. The Continuity of Motion, or, more strictly, of that something which has Motion for one of its sensible forms, underlies the possibility of exact Science and Philosophy. For if motions, visible or invisible, molar or molecular, might either proceed from nothing or lapse into nothing, there could be no scientific interpretation of them.

56. When we speak of the Continuity of Motion we must not think merely of translation through space, for the swing of a pendulum shows us that the loss of visible activity at its highest point, is accompanied by the production of an invisible and latent activity which generates the subsequent motion downwards. The cessation of Motion, considered simply as translation, is not the cessation of an

existence, but is the cessation of a certain *sign of an existence*—a sign occurring under certain conditions.

57. The space-element of Motion is not in itself a thing. Change of position is not an existence, but the manifestation of an existence. This existence may cease to display itself as translation; but it can do so only by displaying itself as strain. And this principle of activity, now shown by translation, now by strain, and often by the two together, is alone that which in Motion we can call continuous.

58. Now displayed by changing position and now by unchanging strain, the principle of activity which Motion shows is ultimately conceived by us under the single form of its equivalent muscular effort. So that the Continuity of Motion, as well as the Indestructibility of Matter, is really known to us in terms of *force*.

59. All proofs of the Continuity of Motion involve the postulate that the quantity of force is constant. We can mentally diminish the velocity or space-element of motion, by diffusing the momentum or force-element over a larger mass of matter; but the quantity of this force-element, which we regard as the cause of the motion, is unchangeable in thought.

NOTE.—It is needful to state that some of the words, such as *strain*, used in this division have somewhat larger implications than are usual.

VI. THE PERSISTENCE OF FORCE.

60. The forms of our experience oblige us to distinguish between two modes of force; the one not a worker of change and the other a worker of change, actual or potential. The first of these—the space-occupying kind of force—has no specific name. For the second kind of force, the specific term now accepted is "Energy." It is the common name for the power shown alike in the movements of masses and in the movements of molecules. While recognizing the fundamental distinction between that *in-*

trinsic force by which body manifests itself as occupying space, and that *extrinsic* force distinguished as energy; the two may here be treated together as being alike persistent.

61. Persistence of either of these species of force cannot be proved; for it must be assumed in every experiment or observation by which it is proposed to prove it. As before shown (§ 23), derivative truths cannot be merged in those wider and wider truths from which they are derived, without reaching at last a widest truth which can be merged in no other, or derived from no other. And whoever contemplates the relation in which it stands to the truths of science in general, will see that this truth transcending demonstration is the Persistence of Force.

62. But what is the force of which we predicate persistence? It is that Absolute Force of which we are indefinitely conscious as the necessary correlate of the force we know. And thus we come once more to that ultimate truth in which, as we saw, Religion and Science coalesce. To the continued existence of an Unknowable as the necessary correlative of the Knowable.

VII. THE PERSISTENCE OF RELATIONS AMONG FORCES.

63. The first deduction to be drawn from the ultimate universal truth that force persists, is that the relations among forces persist.

64. Given charges of powder alike in quantity and quality, fired from barrels of the same structure, and propelling bullets of equal weights, sizes, and forms, similarly rammed down; and no difference can be imagined among the results without it arises uncaused—by the creation or annihilation of force. And that which here holds between antecedents and consequents that are comparatively simple, must hold however involved the antecedents and the consequents may be.

65. Thus what is called uniformity of law, resolvable into the persistence of relations among forces, is an immediate

corollary from the persistence of force. It will become more and more clear as we advance.

VIII. THE TRANSFORMATION AND EQUIVALENCE OF FORCES.

66. Let us glance first at some facts showing the metamorphoses of the physical forces. The arrest of Motion may produce heat, as by friction; electricity, as by rubbed sealing-wax; magnetism, as by percussion on iron; or light, as by the flint and steel. Heat may be transformed into motion, as in the steam-engine; into electricity, as in the thermo-electric pile; into light, as in the oxy-hydrogen lantern; and indirectly, through electricity, into magnetism. The transformations of Electricity into magnetism, heat, and light, are familiar to all. That Magnetism produces motion, is the ordinary evidence we have of its existence; the magneto-electric machine shows its connexion with electricity; and Faraday exhibited its effect on polarized light. A vast number of substances, both elementary and compound, are notably affected by Light. And the genesis of all other modes of force from chemical action scarcely needs pointing out. In every change Force undergoes metamorphosis; and from the new form or forms it assumes, may subsequently result either the previous one or any of the rest, in endless variety of order and combination. It is further becoming manifest that the physical forces are quantitatively, as well as qualitatively, correlated.

67. In order to comprehend the meaning of the great fact that forces, unceasingly metamorphosed, are nowhere increased or decreased, let us consider in succession the phenomena of the concrete sciences, in the hope that we may establish a qualitative correlation that is quantitative to the extent of involving something like a due proportion between causes and effects.

68. The antecedents of those forces which our Solar System displays, belong to a past of which there can never

be anything but inferential knowledge. If, however, we assume that the matter composing the Solar System once existed in a diffused state, there is, in the gravitation of its parts, a force adequate to produce the motions now going on.

69. Geologic changes result from the unexpended heat caused by nebular condensation. We see this, directly, in the fusion and agglutination of sedimentary deposits, in the warming of springs, and in the sublimation of metals into fissures, where they are found as ores. And, indirectly, in the ascent of water vapour which, when condensed, supplies our rain and rivers; and also in the local differences of temperature causing winds, waves, and ocean currents.

70. The forces exhibited in vital actions are similarly derived. Plant-life is all dependent on the heat and light of the Sun, and animal-life is dependent on vegetal life. Besides tracing a qualitative correlation between the organic activities of vegetals and animals, as well as between both of them and inorganic agencies, we may rudely trace a quantitative correlation. Where vegetal life is abundant, we usually find abundant animal life; and as we advance from torrid to temperate and frigid climates, the two decrease together. Speaking generally, the animals of each class reach a larger size in regions where vegetation is abundant, than in those where it is sparse.

71. Many will be alarmed by the assertion, that the forces which we distinguish as mental, come within the same generalization. Yet various classes of facts unite to prove that the law of metamorphosis, which holds among the physical forces, holds equally between them and the mental forces. Those modes of the Unknowable which we call motion, heat, light, chemical affinity, &c., are alike transformable into each other, and into those modes of the Unknowable which we distinguish as sensation, emotion, thought: these, in their turns, being directly or indirectly re-transformable into the original shapes. That no idea or feeling arises, save as a result of some physical force

expended in producing it, is fast becoming a commonplace of science. How this metamorphosis takes place—how a force existing as motion, heat, or light, can become a mode of consciousness—how it is possible for aerial vibrations to generate the sensation we call sound, or for the forces liberated by chemical changes in the brain to give rise to emotion—these are mysteries which it is impossible to fathom. But they are not profounder mysteries than the transformations of the physical forces into each other. They are not more completely beyond our comprehension than the natures of Mind and Matter. They have simply the same insolubility as all other ultimate questions. We can learn nothing more than that here is one of the uniformities in the order of phenomena.

72. The correlation of the social with the physical forces, through the intermediation of the vital ones, is most clearly shown in the different amounts of activity displayed by the same society according as its members are supplied with different amounts of force from the external world. In the effects of good and bad harvests, this relation is yearly illustrated. A greatly deficient yield of wheat is soon followed by a diminution of business. Conversely, an unusually abundant harvest both excites the old producing and distributing agencies, and sets up new ones. If we ask whence come these physical forces, from which the social forces arise, the reply is as heretofore—the solar radiations.

73. It remains to be pointed out, that the universal truth above illustrated under its various aspects, is a necessary corollary from the persistence of force. Setting out with the proposition that force can neither come into existence, nor cease to exist, the several foregoing general conclusions inevitably follow.

IX. THE DIRECTION OF MOTION.

74. Although compelled to believe that the forces of

attraction and repulsion everywhere coexist, they must not be taken as realities, but as our symbols of the reality. They are the forms under which the workings of the Unknowable are cognizable by us—modes of the Unconditioned as presented under the conditions of our consciousness. But while knowing that the ideas thus generated in us are not absolutely true, we may unreservedly surrender ourselves to them as relatively true; and may proceed to evolve a series of deductions having a like relative truth.

75. From universally coexistent forces of attraction and repulsion, there result certain general laws of all movement. We have now to trace these laws throughout the various changes of the Cosmos. We have to note how every motion takes place along the line of greatest traction, of least resistance, or of their resultant; how the setting up of motion along a certain line, becomes a cause of its continuance along that line; how, nevertheless, change of relations to external forces, always renders this line indirect; and how the degree of its indirectness increases with every addition to the number of influences at work.

76. The resultant of the tangential and centripetal forces acting on every planet and satellite, is that curve which each describes—a curve manifestly consequent on the unsymmetrical distribution of the forces around its path. The perturbations show how the line of movement is the resultant of all the forces engaged, and is complicated in proportion as the forces are multiplied.

77. The denudation of lands, and deposition of the removed sediment is obviously determined by the motion of water towards the Earth's centre: the lines of greatest traction and least resistance furnishing the route. That earthquakes continually revisit the same localities; that volcanoes are distributed along certain lines; and that eruptions recur at the same vents; all imply that fractured portions of the Earth's crust soonest yield to pressure.

78. "The formation of the root [of plants] furnishes a beautiful instance of the law of least resistance, for it grows

by insinuating itself, cell by cell, through the interstices of the soil," (J. Hinton, *Life in Nature*, pp. 104-5). That the vessels along which the blood, lymph, bile, and all the secretions, find their ways, are channels of least resistance, is a fact almost too conspicuous to be named as an illustration. From a dynamic point of view, "natural selection" implies structural changes along lines of least resistance. The multiplication of any kind of plant or animal, in localities that are favourable to it, is a growth where the antagonistic forces are less than elsewhere. And the preservation of varieties that succeed better than their allies in coping with surrounding conditions, is the continuance of vital movement in those directions where the obstacles to it are most eluded.

79. The law is not so readily established throughout the phenomena of mind. However, the single instance of laughter, which is an undirected discharge of feeling that affects first the muscles round the mouth, then those of the vocal and respiratory apparatus, then those of the limbs, and then those of the spine; suffices to show that when no special route is opened for it, a force evolved in the nervous centres produces motions along channels which offer the least resistance, and if it is too great to escape by these, produces motion along channels offering successively greater resistance. The transition from special desires to special muscular acts conforms to the same principle. For a volition is itself an incipient discharge along a line which previous experiences have rendered a line of least resistance. And the passing of volition into action is simply a completion of the discharge.

80. When a society is contemplated as an organism, the direction of its growth is found to be that which in the average of opposing forces is the least. Reducing the matter to its ultimate terms, we may say that social units have jointly and severally to preserve themselves and their offspring from those inorganic and organic forces which are ever tending to destroy them (either indirectly

by oxidation and by undue abstraction of heat, or directly by bodily mutilation); that these forces are either counteracted by others which are available in the shape of food, clothing, habitations, and appliances for defence, or are, as far as may be, eluded; and that population spreads in whichever directions there is the readiest escape from these forces, or the least exertion in obtaining materials for resisting them, or both. Nor is the law less clearly to be traced in the functional changes which are daily going on. The flow of capital into businesses yielding the largest returns; the buying in the cheapest market and selling in the dearest; and all the variations in the currents of trade noted in the newspapers; exhibit movement taking place in directions where it is met by the smallest total of opposing forces.

81. The general truth set forth in this division is a necessary deduction from the persistence of force. When a warrant is sought for the assumption that of two conflicting forces, that is the greater which produces motion in its own direction, we find no other than the consciousness that such part of the greater force as is unneutralized by the lesser, must produce its effect—the consciousness that this residuary force cannot disappear, but must manifest itself in some equivalent change—the consciousness that force is persistent. It is impossible for us ever to get evidence of motion in any other direction than that of the greatest force; since our only measure of relative greatness among forces is their relative power of generating motion.

X. THE RHYTHM OF MOTION.

82. The leaves, the branches, and the very trees themselves, shivering in the gusts, the waving of the blades of grass and of the stalks in the cornfield, the ripple-marks on the river's bed, and its undulating and tortuous course, the vibration following the propeller's rotation in a screw

steamer, the sounds from a bowed violin string, and the etherial undulations of light, heat, and electricity, all alike display simple rhythmical movement. Compound Rhythm —the antagonism and coincidence of primary rhythms producing a secondary rhythm—is seen in the "beats" of two notes of music, the interference of light, and the fortnightly increase and decrease of the daily tides—due to the alternate coincidence and antagonism of the solar and lunar attractions. Rhythm results wherever there is a conflict of forces not in equilibrium. For moving matter cannot present unchanging relations to the sources of force by which its motion is produced and opposed: every further transfer through space altering the ratio between the forces concerned. The probabilities are infinitely great against a truly rectilinear or a perfectly circular rhythm. There is never a complete return to a previous state.

83. Rhythm is shown in astronomical phenomena, by the spiral arrangement so general among the more diffused nebulæ; by the alternate brightening and fading of the variable stars; by the periodicities of the planets, satellites, and comets; and by the varying quantity of light and heat which any portion of the Earth receives from the Sun.

84. Those terrestrial processes whose dependence on the solar heat is direct, of course exhibit a rhythm that corresponds to the periodically changing amount of heat which each part of the Earth receives. Variations in the quantities of sediment brought down by rivers that rise and fall with the seasons, must cause variations in the resulting strata—alternations of colour or quality in the successive laminæ. Beds formed from the detritus of shores worn down and carried away by the waves, must similarly show periodic differences answering to the periodic winds of the locality. There is evidence also that modifications in the Earth's crust due to igneous action have a certain periodicity.

85. The periodicities determined by day and night, and by the seasons are shown in plants. Animals show the

peristaltic motion of the intestines, the blood propelled in pulses, the oscillating movements of locomotion, the periodic need for food and repose, the alternations of greater and less vigour, and the intermittent character of sundry disorders. Aggregates of living creatures illustrate the general truth in other ways. Palæontology shows species to have appeared, become abundant, and then to have disappeared. The evidence clearly shows that Life on the Earth has not progressed uniformly, but in immense undulations.

86. It is not manifest that the changes of consciousness are in any sense rhythmical. Yet here, too, analysis proves both that the mental state existing at any moment is not uniform, but is decomposable into rapid oscillations; and also that mental states pass through longer intervals of increasing and decreasing intensity. The current of mental energy that shows itself in such modes of bodily action as dancing, poetry, and music, is not continuous, but falls into a succession of pulses. Still longer undulations may be observed on occasions of extreme pleasure or extreme pain. During hours in which bodily pain never actually ceases, it has its variations of intensity.

87. In nomadic societies the changes of place, determined as they usually are by exhaustion or failure of the supply of food, are periodic; and in many cases show a recurrence answering to the seasons. In the currents of commerce—in exchange, production and consumption, supply and demand—or, in the tabulated diagrams of prices, births, marriages, deaths, disease, crime, and pauperism, the undulatory character always appears. The irregularity resulting from the combination of many causes is well illustrated by the social rhythms; for while a price may be repeated, a political reaction never brings round just the old form of things.

88. The only conditions under which there could be absence of rhythm—the only conditions, that is, under which there could be a continuous motion through space in the same straight line for ever, would be the existence of an infinity void of everything but the moving body. And

neither of these conditions can be represented in thought. Infinity is inconceivable; and so also is a motion which never had a commencement in some pre-existing source of power. Thus, then, rhythm is a necessary characteristic of all motion. Given the coexistence everywhere of antagonist forces—a postulate necessitated by the form of our experience—and rhythm is an inevitable corollary from the persistence of force.

XI. RECAPITULATION, CRITICISM, AND RECOMMENCEMENT.

89. The propositions enunciated and exemplified in the foregoing divisions have transcended the class-limits of Science. They are truths which unify concrete phenomena belonging to all divisions of Nature; and so must be components of that complete, coherent conception of things which Philosophy seeks.

90. Do any of these truths separately or jointly convey an idea of the Cosmos—the totality of the manifestations of the Unknowable? No. For being all analytical, they cannot make up that synthesis of thought which alone can be an interpretation of the synthesis of things.

91. The ultimate interpretation to be reached by Philosophy, is an universal synthesis comprehending and consolidating the special syntheses of the sciences. The question to be answered is—What is the common element in the histories of all concrete processes?

92. The law we seek, must be the law of *the continuous redistribution of matter and motion.* Every object, no less than the aggregate of all objects, undergoes from instant to instant some alteration of state. Hence, our question is—What dynamic principle, true of the metamorphosis as a whole and in its details, expresses these ever-changing relations? The discussion on which we are now to enter, may fitly open with a new presentation of this problem, carrying with it the clear implication that a Philosophy, rightly so-called, can come into existence only by solving the problem.

XII. EVOLUTION AND DISSOLUTION.

93. An entire history of anything must include its appearance out of the imperceptible and its disappearance into the imperceptible. Our Theory of Things, considered individually or in their totality, is confessedly imperfect so long as any portion of their sensible existences are unaccounted for. Philosophy has to formulate this passage from the imperceptible into the perceptible, and again from the perceptible into the imperceptible.

94. The entire series of changes is comprehended in this:—Loss of motion and consequent integration, eventually followed by gain of motion and consequent disintegration.

95. Whatever be the special character of the redistribution—whether that of superficial accretion or detachment, general expansion or contraction, or that of rearrangement, it is always an advance in integration or disintegration. It is always this, though it may at the same time be something further.

96. Everywhere, and to the last, the change at any moment going on forms a part of one or other of the two processes. While the general history of every aggregate is definable as a change from a diffused imperceptible state to a concentrated perceptible state, and again to a diffused imperceptible state; every detail of the history is definable as a part of either the one change or the other. This is that universal law of redistribution of matter and motion, which serves at once to unify the seemingly diverse groups of changes, as well as the entire course of each group.

97. These processes, everywhere in antagonism, are Evolution and Dissolution. We shall everywhere mean by the latter, the absorption of motion and disintegration of matter; and by the former, the process which is always an integration of matter and dissipation of motion, but which, as will now be seen, is in most cases much more than this.

XIII. SIMPLE AND COMPOUND EVOLUTION.

98. Evolution may be of two kinds—simple, where it is integrative only; compound, when in addition supplementary changes take place.

99. An aggregate that is widely diffused, or but little integrated, contains a large quantity of motion; a completely integrated, or dense one, comparatively little. Now, other things being equal, in proportion to this quantity of motion and the time during which it is retained, will be the quantity of secondary change in the arrangement of its parts that accompanies the primary redistribution.

100. No matter under what form the motion contained by an aggregate exists—be it mere mechanical agitation, or the mechanical vibrations such as produce sound, be it molecular motion absorbed from without, or the constitutional molecular motion of some component liquid, the same truth holds throughout. Incident forces work secondary redistributions easily when the contained motion is large in quantity; and work them with increasing difficulty as the contained motion diminishes.

101. The facts of chemical stability fall within the same generalization. Speaking broadly, stable compounds contain comparatively little molecular motion; and in proportion as the molecular motion is great the instability is great. Like the aggregates formed of them, ultimate molecular aggregates become more or less integrated according as they lose or gain motion; and like them also, according as they contain much or little motion, they are liable to undergo secondary redistributions of parts along with the primary redistribution.

102. It may now be seen, in the first place, what are the conditions under which Evolution, instead of being simple, becomes compound. And, in the second place, how the compounding of it can be carried far only under special conditions; since, on the one hand, a large amount of secondary redistribution is possible only where there is a

great quantity of contained motion, and, on the other hand, these redistributions can have permanence only where the contained motion has become small—opposing conditions which seem to negative any large amount of permanent redistribution.

103. These apparently contradictory conditions are, however, reconciled; and, by their reconciliation permanent secondary redistributions immense in extent are made possible. The essential characteristic of living organic matter, in which Evolution becomes so highly compounded, is that it unites a large quantity of contained motion with a degree of cohesion that permits temporary fixity of arrangement.

104. Examination shows not only that organic aggregates differ from other aggregates, alike in the quantity of motion they contain and the amount of rearrangement of parts that accompanies their progressive integration; but also that among organic aggregates themselves, differences in the quantities of contained motion are accompanied by differences in the amounts of redistribution. There is an accumulation of proofs, both general and special, which shows living aggregates to be distinguished by the connected facts, that during integration they undergo very remarkable secondary changes which other aggregates do not undergo to any considerable extent; and that they contain (bulks being supposed equal) immensely greater quantities of motion, locked up in various ways.

105. The reader will now be prepared to find that the primary redistribution ends in forming aggregates which are simple where it is rapid, but which become compound in proportion as its slowness allows the effects of secondary redistributions to accumulate.

106. The next division will be devoted to an account of Evolution under its primary aspect; tacitly recognizing its secondary aspects only so far as the exposition necessitates.

XIV. THE LAW OF EVOLUTION.

107. Deduction has now to be verified by induction. We have to trace the passage of actually existing wholes from a more diffused to a more consolidated state; a concurrent similar passage in every portion of them that comes to have a distinguishable individuality; and a simultaneous increase of combination among such individuated portions.

108. Evolution, under its primary aspect, is illustrated most simply and clearly by the passage of the Solar System from a widely diffused incoherent state to a consolidated coherent state.

109. The history of the Earth, as traced out from the structure of its crust, carries us back to that molten state which the nebular hypothesis implies; and the changes classed as igneous, are the accompaniments of the progressing consolidation of the Earth's substance and accompanying loss of its contained motion.

110. It will suffice to remind the reader that every plant grows by concentrating in itself elements that were before diffused as gases, and that every animal grows by re-concentrating these elements previously dispersed in surrounding plants and animals. How organisms in general are mutually dependent, and in that sense integrated, will be seen on remembering—first, that while all animals live directly or indirectly on plants, plants live on the carbonic acid excreted by animals; second, that among animals the flesh-eaters cannot exist without the plant-eaters; and third, that a large proportion of plants can continue their respective races only by the help of insects, and that in many cases particular plants need particular insects. The Flora and Fauna in each habitat, constitute an aggregate so far integrated that many of its species die out if placed amid the plants and animals of another habitat. And it is to be remarked that this integration, too, increases as organic evolution progresses.

111. In the social organism integrative changes are

clearly and abundantly exemplified. The process through which petty tenures are aggregated into feuds, feuds into provinces, provinces into kingdoms, and finally contiguous kingdoms into a single one, slowly completes itself by destroying the original lines of demarcation. There are other integrations that arise from growth, as the junction of Manchester with its suburbs; from monopoly of business, as the pottery of Staffordshire; from trade aggregation, as the publishers in Paternoster Row; and from the establishment of common centres, as the Bankers' clearing-house and the Exchange.

112. In the integrations of advancing Language, are reflected certain integrations of advancing human structure, individual and social. That in the formation of higher languages out of lower there is a progressive integration, which reduces the polysyllables to dissyllables and monosyllables, is an inference confirmed by the history of our own language; as displayed by the coalescence of *God be with you* into *Good bye*. Again, in the number of subordinate propositions which accompany the principal one; in the various complements to subjects and predicates; and in the numerous qualifying clauses—all of them united into one complex whole—many sentences in modern compositions exhibit a degree of integration not to be found in ancient ones.

113. The history of Science presents facts of the same meaning at every step. Science has become highly integrated not only in the sense that each division is made up of mutually-dependent propositions, but in the sense that the several divisions are mutually dependent—cannot carry on their respective investigations without aid from one another.

114. Nor do the industrial and æsthetic Arts fail to exhibit equally conclusive evidence. We see the progress of integration alike in the advance from rude, simple, and small tools, to perfect, complex, and large machines; on contrasting the mural decorations of the Egyptians and Assyrians with modern historical paintings; on passing

from the simple cadence to the oratorio; and on comparing the simple primitive tales of the East with good modern works of the imagination.

115. Evolution then, under its primary aspect, is a change from a less coherent form to a more coherent form, consequent on the dissipation of motion and integration of matter. This is the universal process through which sensible existences, individually and as a whole, pass during the ascending halves of their histories.

XV. THE LAW OF EVOLUTION—*continued.*

116. Integration of each whole has been described as taking place simultaneously with integration of each of the parts into which the whole divides itself. But how comes each whole to divide itself into parts? This is the second aspect under which Evolution has to be studied. We have here to contemplate existences of all orders as displaying progressive differentiation.

117. Bearing in mind that the planets differ in the inclinations of their orbits, and of their axes, in their specific gravities, and in their physical constitutions, we see how decided is the complexity wrought in the Solar System by those secondary redistributions that have accompanied the primary redistribution.

118. Between our existing Earth, the phenomena of whose varied crust neither geographers, geologists, mineralogists, nor meteorologists have yet enumerated, and the molten globe out of which it was evolved, the contrast in heterogeneity is sufficiently striking. There has been simultaneously going on a gradual differentiation of climates, until every extensive region has its own meteorologic conditions.

119. In every plant and animal, conspicuous secondary redistributions accompany the primary redistribution. A first difference between two parts; in each of these parts other differences that presently become as marked as the first; and a like multiplication of differences in geometrical

progression, until there is reached that complex combination constituting the adult. This is the history of all living things. Pursuing an idea which Harvey set afloat, it has been shown by Wolff and von Baer, that during its evolution each organism passes from a state of homogeneity to a state of heterogeneity. For a generation this truth has been accepted by biologists.

120. Passing from individual forms of life to life in general, and asking whether the same law is seen in the *ensemble* of its manifestations—whether modern plants and animals have more heterogeneous structures than ancient ones, and whether the Earth's present Flora and Fauna are more heterogeneous than the Flora and Fauna of the past. The answer is, that though our knowledge of past life upon the Earth, is too scanty to justify us in asserting an evolution of the simple into the complex, yet the knowledge there is, not only consists with the belief that there has been such an evolution, but rather supports it than otherwise.

121. The advance from the homogeneous to the heterogeneous, is clearly enough displayed in the progress of the latest and most heterogeneous creature—Man. The human organism has not only grown more heterogeneous among the civilised divisions of the species; but the species, as a whole, has been made more heterogeneous by the multiplication of races, and by the differentiation of these races from each other.

122. On passing to Humanity as socially embodied, the general law is still more variously exemplified. The change from the homogeneous to the heterogeneous, is displayed equally in the progress of civilization as a whole, and in the progress of every tribe or nation; and is still going on with increasing rapidity. Beginning with a barbarous tribe, almost if not quite homogeneous in the functions of its members, the progress has been, and still is, towards an economic aggregation of the whole human race; growing ever more heterogeneous in respect of the separate functions assumed by separate nations, by the local sections of each

nation, and by the separate functions assumed by the workers united in producing each commodity.

123. This law is exemplified with equal clearness in the evolution of all products of human thought and action; whether concrete or abstract, real or ideal. The same diffusion over the Earth's surface which has led to the differentiation of the race, has simultaneously led to a differentiation of their speech. The progress of Language conforms to the general law, alike in the evolution of languages, of families of words, and of parts of speech.

124. While written language was passing through its earlier stages of development, the mural decoration which formed its root was being differentiated into Painting and Sculpture. Strange as it seems, it is no less true, that all forms of written language, of painting, and of sculpture, have a common root in the politico-religious decorations of ancient temples and palaces. The effigies on our coins, the signs over shops, the figures that fill every ledger, the coat of arms upon the carriage-panel, and the placards inside the omnibus, are, in common with dolls, blue-books, and paper-hangings, lineally descended from the rude sculpture-paintings in which the Egyptians represented the triumphs and worship of their god-kings. Perhaps no example can be given which more vividly illustrates the multiplicity and heterogeneity of the products that, in course of time, may arise by successive differentiations from a common stock.

125. In the co-ordinate origin and gradual differentiation of Poetry, Music, and Dancing, is another series of illustrations. Rhythm in speech, rhythm in sound, and rhythm in motion, were in the beginning, parts of the same thing; and have only in process of time become separate things. The advance from the homogeneous to the heterogeneous is displayed not only in the separation of these arts from each other and from religion, but also in the multiplied differentiations which each of them afterwards undergoes. Taking music for example, without pointing out in detail the increasing complexity that resulted from

introducing notes of various lengths, from the multiplication of keys, from varieties of time, from modulations and so forth, it needs but to contrast music as it is, with music as it was, to see how immense is the increase of heterogeneity.

126. The development of Literature, Science, Architecture, the Drama, and Dress, all alike show that from the remotest past which Science can fathom, up to the novelties of yesterday, an essential trait of Evolution has been the transformation of the homogeneous into the heterogeneous.

127. Hence, as we now understand it, Evolution is definable as a change from an incoherent homogeneity to a coherent heterogeneity, accompanying the dissipation of motion and integration of matter.

XVI. THE LAW OF EVOLUTION—*continued.*

128. Does this generalization express the whole truth? Does it include everything essentially characterizing Evolution and exclude everything else? A critical examination of the facts will show that it does neither. Some further distinction must therefore be sought.

129. At the same time that Evolution is a change from the homogeneous to the heterogeneous, it is a change from the indefinite to the definite. Along with an advance from simplicity to complexity, there is an advance from confusion to order—from undetermined arrangement to determined arrangement. And this is the distinction sought. Is this advance from the indefinite to the definite everywhere displayed?

130. Beginning, as in the former division, with a hypothetical illustration, we have to note that each step in the evolution of the Solar System, supposing it to have originated from diffused matter, was an advance towards more definite structure.

131. That the transition from the primitive molten

state of the Earth to its existing state has been through stages in which the characters became more determinate; that differences of climates and seasons grew relatively decided as the heat of the Sun became distinguishable from the proper heat of the Earth; and that the production of more specific conditions in each locality was aided by increasing permanence in the distribution of lands and seas; are conclusions sufficiently obvious.

132. In place of deductive illustrations like the foregoing, the evidence furnished by organic bodies displays numerous illustrations, which have been inductively established, and are therefore less open to criticism. The process of mammalian development shows that the changes through which the general structure is marked out with slowly increasing precision, are paralleled in the evolution of each organ, both in the general outlines and detailed structure.

133. As with the increasing heterogeneity of the Earth's Flora and Fauna, so with the increasing definiteness: lack of facts are an obstacle to proof. If, however, we reason from the hypothesis, daily rendered more probable, that species have arisen by modifications; the conclusion is that there must have been a progress from the indeterminate to the determinate.

134. A wandering tribe of savages, being fixed neither in its locality nor in its internal distribution, is far less definite in the relative positions of its parts than a nation. In such a tribe the social relations are similarly confused and unsettled. Political authority is neither well established nor precise. And save in the different occupations of men and women, there are no complete industrial divisions.

135. All organized results of social action, pass through parallel phases. Being, as they are, objective products of subjective processes, they must display corresponding changes; and that they do this, the cases of Language, of Science, of Art, clearly prove.

136. That an essential characteristic of advancing Science

is increase in definiteness, appears almost a truism, when we remember that Science may be described as definite knowledge, in contradistinction to that indefinite knowledge possessed by the uncultured. And if, as is unquestioned, Science has, in the course of ages, been evolved out of this indefinite knowledge of the uncultured; then, the gradual acquirement of that great definiteness which now distinguishes it, must have been a leading trait in its evolution.

137. The industrial and æsthetic Arts, supply illustrations perhaps still more striking. On passing from flint implements to the microscope; from the rude idol to the modern statue; and from the marvellous oriental tale to the fidelity of the good novel; the same truth is forced upon us.

138. Bearing in mind that this advance in definiteness is a secondary phenomenon; the more specific idea of Evolution now reached is—a change from an indefinite, incoherent homogeneity, to a definite coherent heterogeneity, accompanying the dissipation of motion and integration of matter.

XVII. THE LAW OF EVOLUTION—*concluded.*

139. Thus far we have attended only to the redistribution of Matter, neglecting the accompanying redistribution of Motion. Though something has from time to time been said about the escaping motion, nothing has been said about the motion that does not escape. The rhythmical actions going on in each aggregate, must differentiate and integrate at the same time that the structure does so. Here, then, to complete our conception of Evolution, we have to contemplate throughout the Cosmos, the metamorphoses of retained motion that accompany the metamorphoses of component matter. To save space, it will be convenient to deal with the several aspects of the metamorphoses at the same time.

140. The nebulous matter which in its original diffused

state, had motions that were confused, indeterminate, or without sharply-marked distinctions, has, during the evolution of the Solar System, acquired definitely heterogeneous motions.

141. So with the movements of the Earth's crust itself. Small, numerous, local, and similar, while the crust was thin, the elevations and subsidences must, as the crust thickened, have extended over larger areas, must have continued for longer eras in the same directions, and must have been made more unlike in different regions by local differences of structure in the crust.

142. In organisms the advance towards a more integrated, heterogeneous, and definite distribution of the retained motion, is mainly what we understand as the development of functions. That during evolution, functions, like structures, become more consolidated individually, as well as more combined with one another, at the same time that they become more multiform and more distinct, may be seen on calling to mind that, accompanying the structural differentiations and integrations of the alimentary canal, there arise differentiations and integrations of its movements.

143. The phenomena subjectively known as changes in consciousness, are objectively known as nervous excitations and discharges, which science now interprets into modes of motion. Hence, in following up organic evolution, the advance of retained motion in integration, in heterogeneity, and in definiteness, may be expected to show itself—as it does—alike in the visible nervo-muscular actions, and in the correlative mental changes.

144. How in societies the movements or functions produced by the confluence of individual actions, increase in their amounts, their multiformities, their precision, and their combination, scarcely needs allusion after what has been pointed out in foregoing divisions.

145. Our formula, therefore, needs an additional clause, of equal importance to the foregoing. Changing its order for convenience of expression, it finally stands thus:—

Evolution is an integration of matter and concomitant dissipation of motion; during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a paralell transformation.

XVIII. THE INTERPRETATION OF EVOLUTION.

146. We have now to find that these laws of the redistribution of matter and motion, are necessarily correlated with those laws of the direction of motion and the rhythm of motion, previously set forth.

147. The task before us is that of exhibiting the phenomena of Evolution in synthetic order. In other words, the phenomena of Evolution have to be deduced from the Persistence of Force.

148. The various resolutions of force that accompany the redistribution of matter and motion have to be considered. Let us therefore bear in mind the following:—That of the whole incident force affecting an aggregate, the effective force is that which remains after deducting the non-effective; that the temporarily effective and the permanently effective vary inversely; and that the molar and molecular changes wrought by the permanently effective force also vary inversely.

XIX. THE INSTABILITY OF THE HOMOGENEOUS.

149. Though the genesis of the rearrangement undergone by every evolving aggregate, is in itself one, it presents to our intelligence several factors. They may be considered separately. The proposition which comes first in logical order, is that some rearrangement must result; specifically, that the condition of homogeneity is one of unstable equilibrium. The instability of the homogeneous —illustrated by such facts as that red-hot matter however evenly heated soon ceases to be so, and that a pair of

scales perfectly balanced will not remain so—is obviously consequent on the fact, that the several parts of any homogeneous aggregation are necessarily exposed to different forces, and are of necessity differently modified. The relations of outside and inside, and of comparative nearness to neighbouring sources of influence, imply the reception of influences that are unlike in quantity or quality, or both; and it follows that unlike changes will be produced in the parts thus dissimilarly acted upon. The general principle, now to be followed out in its applications, is thus somewhat more comprehensive than the title of the division implies.

150. Turning to the Solar System as it now is, it deserves to be noted, that though at first sight the Saturnian system appears at variance with the doctrine that a state of homogeneity is one of unstable equilibrium, it does in reality furnish a curious confirmation of this doctrine. For Saturn is not quite concentric with his rings; and it has been proved mathematically that were he and his rings concentrically situated, they could not remain so: the homogeneous relation being unstable, would gravitate into a heterogeneous one. And this serves to bring to mind the allied fact presented throughout the whole Solar System. All orbits, whether of planets or satellites, are more or less eccentric—none of them are perfect circles; and were they perfect circles they would soon become ellipses. Mutual perturbations would inevitably generate eccentricities. That is to say, the homogeneous relations would lapse into heterogeneous ones.

151. In the cooling down and solidification of the originally incandescent Earth's surface, there is one of the simplest, as well as one of the most important, instances, of that change from a uniform to a multiform state which occurs in any mass through exposure of its different parts to different conditions. The meteorologic processes eventually set up in the Earth's atmosphere further illustrate the alleged law. They equally display that destruction of a homogeneous state which results from unequal exposure to incident forces.

152. The most general fact which can be asserted with respect to the structures of plants and animals, is, that however much alike in shape and texture the various parts of the exterior may at first be, they acquire unlikenesses corresponding to the unlikenesses of their relations to surrounding agencies. The ciliated germ of a Zoophyte, which, during its locomotive stage, is distinguishable only into outer and inner tissues, no sooner becomes fixed, than its upper end begins to assume a different structure from its lower. The disc-shaped *gemmæ* of the *Marchantia*, originally alike on both surfaces, and falling at random with either side uppermost, immediately begin to develop rootlets on the under side, and *stomata* on the upper side: a fact proving beyond question, that this primary differentiation is determined by this fundamental contrast of conditions. It remains to point out that in the assemblage of organisms constituting a species, the principle enunciated is equally traceable. The lapse of a species from a state of homogeneity to a state of heterogeneity arises from the exposure of its different parts to different aggregates of forces.

153. To show satisfactorily how states of consciousness, originally homogeneous, become heterogeneous through differences in the changes wrought by different forces, would require us carefully to trace out the organization of early experiences. Were this done it would become manifest that the development of intelligence, is, under one of its chief aspects, a resolving of the once confused aggregate of objects known, into an aggregate which unites extreme heterogeneity among its multiplied groups, with complete homogeneity among the members of each group.

154. Masses of men, in common with all other masses, show a like proclivity similarly caused. A result of differences in soil and climate, is that the rural inhabitants in different parts of the kingdom have their occupations partially specialized; and become respectively distinguished as chiefly producing cattle, or sheep, or wheat, or hops. People living where coal-fields are discovered are transformed into colliers;

Cornishmen take to mining because Cornwall is metalliferous; and the manufacture of iron is the dominant industry where iron-stone is plentiful.

155. That the instability of the homogeneous is a corollary from the persistence of force, has already been implied by assigning unlikeness in the exposure of the parts of a uniform mass to surrounding agencies, as the reason why it loses its uniformity. To the conclusion that the changes with which Evolution *commences*, are thus necessitated, remains to be added the conclusion that these changes must *continue*. The absolutely homogeneous must lose its equilibrium; and the relatively homogeneous must lapse into the relatively less homogeneous. That which is true of any total mass, is true of the parts into which it segregates. The uniformity of each such part must as inevitably be lost in multiformity, as was that of the original whole, and for like reasons.

XX. THE MULTIPLICATION OF EFFECTS.

156. To the cause of increasing complexity just set forth, has to be added another. Action and reaction being equal and opposite, it follows that in differentiating the parts on which it falls in unlike ways, the incident force must itself be correspondingly differentiated. Thus, when one body is struck against another, there may be, besides the mechanical result, sound, air currents, fracture, incandescence, and chemical combination. An incident force decomposed by the reactions of a body into a group of unlike forces—a uniform force thus reduced to a multiform force—becomes the cause of a secondary increase of multiformity in the body which decomposes it. This multiplication of effects must proceed in geometrical progression. Each stage of evolution must initiate a higher stage.

157. The multiplication of effects in the phenomena of the Solar System will be readily seen on bringing to mind the influences of any one member on the rest. The force

exercised by any planet works a different effect on each of the rest; and this different effect is, from each as a centre, partially broken up into minor different effects on the rest; and so on in ever multiplying and diminishing waves throughout the entire system.

158. The multiplied changes arising from the continuance of one cause—diminishing heat—are aptly shown on the terrestrial surface. The Earth, falling in temperature, must contract. Hence the solid crust at any time existing, is presently too large for the shrinking nucleus; and being unable to support itself, inevitably follows the nucleus, which causes it to run into ridges, as the rind of an apple does when the bulk of its interior decreases from evaporation. As the cooling progresses and the envelope thickens, the ridges rise ultimately into hills and mountains. The later systems of mountains thus produced being the highest and longest. Hence, leaving out of view other modifying forces, we see what immense heterogeneity of surface arises from the one cause, loss of heat—a heterogeneity which the telescope shows to be paralleled on the Moon, where aqueous and atmospheric agencies have been absent.

159. This all-pervading principle has next to be glanced at throughout organic evolution. Observe, first, how numerous are the changes which any marked stimulus works on a human being, for instance. An alarming sound or sight, may produce an excited action of the heart, a rush of blood to the brain, and, if the system be feeble, an illness with a long train of complicated symptoms. Medicines, special foods, better air, might in like manner be instanced as producing multiplied results. It needs only to consider that the many changes thus wrought by one force on an adult organism, must be partially paralleled in an embryo-organism, to understand how here also the production of many effects by one cause is a source of increasing heterogeneity. The external heat and other agencies which determine the first complications of the germ, will, by acting on these, superinduce further complications; on these still

higher and more numerous ones; and so on continually: each organ as it is developed, serving, by its actions and reactions on the rest, to initiate new complexities. The growth of each tissue, by taking from the blood special proportions of elements, must modify the constitution of the blood; and so must modify the nutrition of all the other tissues. And so with every additional part and every alteration in the ratio of parts.

160. A sensation does not expend itself in arousing some single state of consciousness; but the state of consciousness aroused is made up of various represented sensations connected by coexistence, or sequence with the presented sensation. And that, in proportion as the grade of intelligence is high, the number of ideas suggested is great, may be readily inferred. There is proof that each change is the parent of many changes; and that the multiplication increases in proportion as the area affected is complex.

161. If the advance of Man towards greater heterogeneity in both body and mind, is in part traceable to the production of many effects by one cause, still more clearly may the advance of Society towards greater heterogeneity be so explained. Take, for instance, the locomotive engine. This, as the proximate cause of our railway system, has changed the face of the country, the course of trade, and the habits of the people. Passing over the complicated sets of changes that precede the making of every railway; and the yet more marked changes implied in railway construction; we come to the changes, more numerous and involved still, which railways in action produce on the community at large. The organization of every business is more or less modified. The rapidity and small cost of carriage, tend to specialize more than ever the industries of different districts—to confine each manufacture to the parts in which, from local advantages, it can be best carried on. Economical distribution equalizes and lowers prices: thus bringing divers articles within the means of those before unable to buy them, and so increasing their comforts and

improving their habits. At the same time the practice of travelling is immensely extended.

162. The conclusions that a part-cause of Evolution is the multiplication of effects; and that this increases in geometrical progression as the heterogeneity becomes greater; are not only to be established inductively, but they are deducible from the deepest of all truths. The multiplication of effects is a corollary from the persistence of force.

XXI. SEGREGATION.

163. The general interpretation of Evolution is still far from being completed in the preceding divisions. Thus far no reason has been assigned why there should not ordinarily arise a vague chaotic heterogeneity, in place of that orderly heterogeneity displayed in Evolution. It still remains to find out the cause of that local integration which accompanies local differentiation—that gradually-completed segregation of like units into a group, distinctly separated from neighbouring groups which are severally made up of other kinds of units. Take a handful of any pounded substance containing fragments of all sizes; and let it fall to the ground while a gentle breeze is blowing. The large fragments will be collected together on the ground almost immediately under the hand; somewhat smaller fragments will be carried a little to the leeward; still smaller ones a little further; and the particles of dust will be drifted a long way before they reach the earth. That is, the incident force impresses unlike motions on the mixed units in proportion as they are unlike; and therefore, in proportion as they are unlike, tends to deposit them in separate places. A converse cause of segregation must be named. If different units acted on by the same force, must be differently moved; so, too, must units of the same kind be differently moved by different forces. There is also the complementary truth; that mixed forces are segregated by the reaction of uniform matters, just as mixed matters are segregated by the action of uniform forces.

164. The formation and detachment of a nebulous ring, illustrates this general principle. It conforms to the law that among like units, exposed to unlike forces, the similarly conditioned part from the dissimilarly conditioned.

165. Trace the history of each geologic deposit, and we are quickly led down to the fact, that mixed fragments of matter, differing in their sizes or weights, are, when exposed to the momentum and friction of water, joined with the attraction of the Earth, selected from each other, and united into groups of comparatively like fragments. And we see that, other things being equal, the separation is definite in proportion as the differences of the units are marked.

166. Just as the changing autumn leaves are picked out by the wind from among the green ones around them; so, the uniform incidence of external forces affects the members of a group of organisms similarly in proportion as they are similar, and differently in proportion as they are different; and thus is ever segregrating the like by parting the unlike from them. Whether these separated members are killed off, as mostly happens, or whether, as otherwise happens, they survive and multiply into a distinct variety, in consequence of their fitness to certain partially unlike conditions, matters not to the argument. The one case conforms to the law, that the unlike units of an aggregate are sorted into their kinds and parted when uniformly subject to the same incident forces; and the other to the converse law, that the like units of an aggregate are parted and separately grouped when subject to different incident forces.

167. Mental evolution under one of its leading aspects, was found to consist in the formation of groups of like objects and like relations—a differentiation of the various things originally confounded together in one assemblage, and an integration of each separate order of things into a separate group (§ 153). Here it needs only be said, that while unlikeness in the incident forces is the cause of such differentiations, likeness in the incident forces is the cause of such integrations.

168. With units so complicated as those which constitute a society, and with forces so involved as those which move them, the resulting selections and separations must be far more entangled, or far less definite, than any of the foregoing. But though there may be pointed out many anomalies which at first sight seem inconsistent with the alleged law, a closer study shows that they are but subtler illustrations of it. For human similarities being of various kinds, lead to various orders of segregation. It needs but to glance round at the caste-divisions, the associations for philanthropic, scientific, and artistic purposes, the religious parties and social cliques; to see that some species of likeness among the component members of each body determines their union. Social segregations conform entirely to the same principle as all other segregations.

169. The general truth, thus variously illustrated, may be deduced from the persistence of force. For the abstract propositions involved amount to this:—that in the actions and reactions of force and matter, an unlikeness in either of the factors necessitates an unlikeness in the effects; and that in the absence of unlikeness in either of the factors the effects must be alike. The immediate dependence of these propositions on the persistence of force thus becomes obvious.

XXII. EQUILIBRATION.

170. And now towards what do these changes tend? Whether we watch concrete processes, or whether we consider the question in the abstract, we are alike taught that Evolution has an impassable limit. In all cases there is a progress towards equilibration. That universal coexistence of antagonist forces which necessitates the universality of rhythm, and the decomposition of every force into divergent forces, at the same time necessitates the ultimate establishment of a balance. The Evolution of every aggregate must go on until a moving equilibrium, or *equilibrium mobile*, is established; since an excess of force which the

aggregate possesses in any direction, must eventually be expended in overcoming resistances to change in that direction: leaving behind only those movements which compensate each other, and so form a moving equilibrium. Respecting the structural state simultaneously reached, it must obviously be one presenting an arrangement of forces that counterbalance all the forces to which the aggregate is subject. So long as there remains a residual force in any direction—be it excess of a force exercised by the aggregate on its environment, or of a force exercised by its environment on the aggregate, equilibrium does not exist; and therefore the redistribution of matter must continue. Whence it follows that the limit of heterogeneity towards which every aggregate progresses, is the formation of as many specializations and combinations of parts, as there are specialized and combined forces to be met.

171. Those successively changed forms which, if the nebular hypothesis be granted, must have arisen during the evolution of the Solar System, were so many transitional kinds of moving equilibrium; severally giving place to more permanent kinds on the way towards complete equilibration. Thus, the assumption of an oblate spheroidal figure by condensing nebulous matter, was the assumption of a temporary and partial moving equilibrium among the component parts—a moving equilibrium that must have slowly grown more settled, as local conflicting movements were dissipated. The law of equilibration is also illustrated in the motion of masses, produced during Evolution, being slowly re-diffused in molecular motion of the etherial medium. Excessively remote as may be the state when all the motions of masses shall be transformed into molecular motion, and all the molecular motion equilibrated; yet such a state of complete integration and complete equilibration, is that towards which the changes now going on throughout the Solar System inevitably tend.

172. From the highest point of view, all terrestrial changes are incidents in the course of cosmical equilibration.

For of the incessant alterations which the crust and atmosphere of the Earth undergo, those which are not due to the still progressing motion of the Earth's substance towards its centre of gravity, are due to the still progressing motion of the Sun's substance towards its centre of gravity: the continuance of which integrations is a continuance of that transformation of sensible motion into insensible motion which ends in equilibration.

173. Every living body exhibits, in a four-fold form, the process we are tracing out—exhibits it from moment to moment in the balancing of mechanical forces; from hour to hour in the balancing of functions; from year to year in the changes of state that compensate changes of condition; and finally in the complete arrest of vital movements at death. Groups of organisms display this universal tendency towards a balance very obviously. For every species of plant and animal is perpetually undergoing a rhythmical variation in number—now from abundance of food and absence of enemies, rising above its average; and then by a consequent scarcity of food and abundance of enemies, being depressed below its average. Amid these oscillations, lies that average number of the species at which its expansive tendency is in equilibrium with surrounding repressive tendencies.

174. The equilibrations of the nervous actions which constitute mental life, may be classified in like manner with those which constitute what are distinguished as bodily life. Possibly, some will fail to see how these equilibrations can be classed with those preceding them. Nevertheless such equilibrations are as truly physical as the rest. The existence in any individual of an emotional stimulus, that is in equilibrium with certain external requirements, is literally the habitual production of a certain specialized portion of nervous energy, equivalent in amount to a certain order of external resistances that are habitually met. And thus the ultimate state, forming the limit towards which Evolution carries us, is one in which the kinds and quantities of mental energy daily generated and transformed into

motions, are equivalent to, or in equilibrium with, the various orders and degrees of surrounding forces which antagonize such motions.

175. In society the process of equilibration is seen in the conflicts between Conservatism (which stands for the restraints of society over the individual) and Reform (the liberty of the individual against society), which fall within slowly approximating limits. This process, now so far advanced among ourselves that the oscillations are comparatively unobtrusive, must go on till the balance between the antagonist forces approaches indefinitely near perfection. For, the adaptation of man's nature to the conditions of his existence, cannot cease until the internal forces which we know as feelings are in equilibrium with the external forces they encounter. And the establishment of this equilibrium, is the arrival at a state of human nature and social organization, such that the individual has no desires but those which may be satisfied without exceeding his proper sphere of action, while society maintains no restraints but those which the individual voluntarily respects. The ultimate abolition of all limits to the freedom of each, save those imposed by the like freedom of all, must result from the complete equilibration between man's desires and the conduct necessitated by surrounding conditions.

176. From the persistence of force follow, not only the various direct and indirect equilibrations going on around, together with that cosmical equilibration which brings Evolution under all its forms to a close; but also those less manifest equilibrations shown in the re-adjustments of moving equilibria that have been disturbed. The persistence of force affords a basis for the inference, that there is a gradual advance towards harmony between man's mental nature and the conditions of his existence. After finding that the various characteristics of Evolution are deducible from it, we are led to the belief, that Evolution can end only in the establishment of the greatest perfection and the most complete happiness.

XXIII. DISSOLUTION.

177. When an aggregate has reached that equilibrium in which its changes end; it thereafter remains subject to all actions in its environment which may increase the quantity of motion it contains, and which are sure, either slowly or suddenly, to give its parts such excess of motion as will cause disintegration. The course of change in the Dissolution so caused being the reverse of Evolution, the illustrations of it may properly be taken in the reverse order.

178. It is obvious that the social dissolution which follows the aggression of another nation, is, under its broadest aspect, the incidence of a new external motion; and when, as sometimes happens, the conquered society is dispersed, its dissolution is literally a cessation of those corporate movements which the society, both in its army and in its industrial bodies, presented, and a lapse into individual or uncombined movements—the motion of units replaces the motion of masses.

179. In organic dissolution there is a transformation of the motion of aggregates into the motion of units. Death ends all the integrated motions of evolution; and the process of decay shows an increase of the insensible movements, in the fact that the gases generated by decomposition contain more motion than the matters from which they arise. That motion has been absorbed is evident when it is considered that without heat, without motion, no organic decomposition can take place.

180. The waves rolling about the small pieces of the undermined cliff, and in storms turning over and knocking together the larger blocks, reduce them to boulders and pebbles, and at last to sand and mud. As many a shore shows, the conglomerate itself is sooner or later subject to the like processes; and its cemented masses of heterogeneous components, lying on the beach, are broken up and worn away by impact and attrition—that is, by communicated mechanical motion.

181. The Earth as a whole, after its evolution, must remain, like all smaller aggregates, exposed to the contingencies of its environment; and in the course of those ceaseless changes in progress throughout a Universe of which all parts are in motion, must, at some period, be subject to forces sufficient to cause its complete disintegration.

182. If, pushing to its extreme the argument that Evolution must come to a close in complete equilibrium or rest, the reader suggests that for aught which appears to the contrary, the Universal Death thus implied will continue indefinitely, it is legitimate to point out how, on carrying the argument still further, we are led to infer a subsequent Universal Life. Motion as well as Matter being fixed in quantity, it would seem that the change in the distribution of Matter which Motion effects, coming to a limit in whichever direction it is carried, the indestructible Motion thereupon necessitates a reverse distribution. Apparently, the universally coexistent forces of attraction and repulsion, which, as we have seen, necessitate rhythm in all minor changes throughout the Universe, also necessitate rhythm in the totality of its changes—produce now an immeasurable period during which the attractive forces predominating, cause universal concentration, and then an immeasurable period during which the repulsive forces predominating, cause universal diffusion—alternate eras of Evolution and Dissolution. And thus there is suggested the conception of a past during which there have been successive Evolutions analogous to that which is now going on; and a future during which successive other such Evolutions may go on—ever the same in principle but never the same in concrete result.

183. Thus we are led to the conclusion that the entire process of things, as displayed in the aggregate of the visible Universe, is analogous to the entire process of things as displayed in the smallest aggregates.

XXIV. SUMMARY AND CONCLUSION.

184. Let us now retire a space to see the general character of the conclusions, and the unity of the general truths reached; and thus exemplify once more the integration of Evolution.

185. Accepting the conclusion that the integrated form of knowledge is the highest, and its achievement the end of Philosophy; we went on to consider the data with which Philosophy must set out; the properties of Matter and Motion; and that ultimate truth whence all other truths are derived. From which the Uniformity of Law, the Correlation of Forces, and the Law and Rhythm of Motion were found to follow.

186. We then perceived that Philosophy must formulate the whole series of changes passed through by every existence, in its passage from the imperceptible to the perceptible, and again from the perceptible to the imperceptible. This law of the entire cycle of changes passed through by every existence, was found to be:—Loss of motion and consequent integration, eventually followed by gain of motion and consequent disintegration. Naming the former change Evolution, which was afterwards differentiated into simple and compound; and the latter change Dissolution.

187. We went on to consider the law of Evolution, as exhibited among all orders of existences, in general and in detail. Uniting the separate aspects of the transformation into a single conception, we found the redistribution of the matter and of its retained motion, to be from a diffused, uniform, and indeterminate arrangement, to a concentrated, multiform, and determinate arrangement.

188. Here, an addition may be made to the general argument while summing it up. We have repeatedly observed that while any whole is evolving, there is always going on an Evolution of the parts into which it divides itself; but we have not observed that this equally holds of the totality of things, as made up of parts within parts from the greatest

down to the smallest. There are not many metamorphoses similarly carried on; but there is a single metamorphosis universally progressing, wherever the reverse metamorphosis has not set in.

189. Our next step was to show why, Force being persistent, the transformation which Evolution shows us necessarily results. We saw an increase in multiformity to follow primarily from the Instability of the Homogeneous; and secondarily, from the Multiplication of Effects: and an increase in definiteness from the Segregation of mixed units. To the question whether these processes have any limit, there came the answer that they must end in equilibrium. But the fact which it here chiefly concerns us to remember, is that each of these laws of the redistribution of Matter and Motion, was found to be deducible from the Law of the Persistence of Force.

190. Finally we turned to contemplate that process of Dissolution which forms the complement of Evolution; and which inevitably, at some time or other, undoes what Evolution has done. A conclusion again deducible from the Persistence of Force.

191. So rounding off the argument, the result is brought into complete coalescence with the conclusion reached in Chapter I.; where, independently of any enquiry like the foregoing, we dealt with the relation between the Knowable and the Unknowable.

192. Let no one suppose that the truth of the doctrine of Evolution depends upon the truth of the minor propositions used in illustrating it. It depends upon the validity of its general truths: until these are shaken a high warrant may be claimed for its truth.

193. The development of Knowledge into an organized aggregate of deductions from the Persistence of Force, can be achieved only in the remote future; and, indeed, cannot be completely achieved even then. To reduce the facts now accumulated to something like co-ordination, is the plea for the succeeding parts of this volume; dealing with

the respective divisions of what was distinguished at the outset as Special Philosophy.

194. Before proceeding to interpret the detailed phenomena of Life, Mind, and Society, in terms of Matter, Motion, and Force, it will be well to summarize the foregoing Philosophico-Religious doctrine. The interpretation of all phenomena in terms of Matter, Motion, and Force, is nothing more than the reduction of our complex symbols of thought, to the simplest symbols; and nothing more than symbols. The reasonings in the foregoing pages afford no support to either Materialist or Spiritualist respecting the ultimate nature of things. He who rightly interprets this work, will see that though the relation of subject and object renders necessary to us the antithetical conceptions of Spirit and Matter; the one is no less than the other to be regarded as but a sign of the Unknown Reality which underlies both.

"*In logical order should here come the application of these First Principles to Inorganic Nature. But this great division it is proposed to pass over; partly because, even without it, the scheme is too extensive; and partly because the interpretation of Organic Nature after the proposed method, is of more immediate importance.*"

PART II.

will therefore treat of:—

"THE PRINCIPLES OF BIOLOGY."

CHAPTER III.

THE DATA OF BIOLOGY.

"Including those general truths of Physics and Chemistry with which rational Biology must set out."

I. ORGANIC MATTER.

1. It was shown (*First Principles*, § 163), that an incident force falling on units that are but little dissimilar does not readily segregate them; but that it readily segregates them if they are widely dissimilar. Hence, the extreme contrasts in the physical mobilities and chemical activities, of the four elements of which organisms are almost wholly composed—oxygen, hydrogen, nitrogen and carbon—are favourable in the highest degree to differentiation and integration.

2. Among the binary combinations of these four chief organic elements, there is a molecular mobility much less than that of the elements themselves; at the same time that it is much greater than that of binary compounds in general. Considering them chemically, they are also less stable; and the majority display a smaller degree of chemical energy than the average of binary compounds. These binary compounds, like their elements, are to a considerable degree characterized by the prevalence among them of allotropism; or, as it is more usually called when displayed by compound bodies—isomerism. One further fact must not be overlooked. The binary compounds which form parts of the living tissues of plants and animals are practically confined to one group—the hydro-carbons: of which they are among the most unstable and inert.

3. The substances which contain three of these chief organic elements, the ternary compounds, show a marked decrease again of molecular mobility, and of chemical stability and activity. Isomerism and polymerism are of frequent occurrence. Dividing these compounds into two groups, those which are in, and those which are not in, living tissues; the former have less molecular mobility and greater chemical instability and inertness than the latter.

4. Among compounds containing all the four chief organic elements, a division analogous to that just named may be made. There are some which result from the decomposition of living tissues; there are others which make parts of living tissues in their state of integrity; and these two groups are contrasted in their properties in the same way as are the parallel groups of ternary compounds.

5. Proceeding on mechanical principles, we may infer that, other things equal, as the masses of atoms increase, the molecular mobility must decrease; that the relative positions of their component atoms will be more readily changed by incident physical forces; and further, that the aggregate will approximate to the spherical form—will be chemically inert, and will fail to crystallize.

6. Here we are naturally introduced to Graham's researches, showing that solid substances exist under two forms—the *colloid* or jelly-like, as starch; and the crystalloid or crystal-like. "The colloidal is, in fact, a dynamical state of matter, the crystalloidal being the statical condition. The colloid possesses *energia*. It may be looked upon as the probable primary source of the force appearing in the phenomena of vitality. To the gradual manner in which colloidal changes take place (for they always demand time as an element) may the characteristic protraction of chemico-physical changes also be referred" (*Chemical and Physical Researches*, 1876, p. 554).

7. But the fact of chief interest here, is that the relatively small-atomed crystalloids have immensely greater diffusive power than the relatively large-atomed colloids.

The differences of diffusibility in each class are small compared with the difference between the diffusibility of the crystalloids as a class, and the diffusibility of the colloids as a class. These researches also lead to the conclusion, which was before drawn from first principles, that the great unlikeness among the combined units composing organic bodies must facilitate differentiations.

8. The necessity for that peculiar composition which organic matter displays, may now be seen. Without extreme molecular mobility there could not be the quick escape for the waste products of organic action; nor that active change of matter which vitality implies. And without immensely complex compounds, comparatively immobile by their inertia, the components of living tissue must diffuse away along with the products of decomposition.

9. Thus in the substances of which organisms are composed, the conditions necessary to that redistribution of Matter and Motion which constitutes Evolution, are fulfilled in a far higher degree than at first appears. To all which add, that the state of warmth, or increased molecular vibration, in which all the higher organisms are kept, increases these various facilities for redistribution: not only as aiding chemical changes, but as accelerating the diffusion of crystalloid substances.

II. THE ACTIONS OF FORCES ON ORGANIC MATTER.

10. It follows from the presence of colloids—which yield with great readiness to pressures and tensions—in organic matter, that this latter is modifiable, in a far greater degree than ordinary matter, by arrested momentum or by continuous strain.

11. The powers possessed by colloids, called "capillary affinity" and "osmosis," also aid alterations in organic matter. The imbibition and transmission of water and watery solutions produce both direct and indirect effects.

12. Heat not only enables incident forces more easily to

produce changes of molecular arrangement in organic matter; but, by facilitating evaporation, it becomes also an agent of redistribution.

13. Light, which is now known to modify many inorganic compounds, may be expected to produce marked effects on substances so complex and unstable as those which make up organic bodies. It does produce such marked effects; and some of them are among the most important that organic matter undergoes. It is not here necessary to ascertain *how* light produces these compositions and decompositions: it is necessary only to observe that it *does* produce them. That the characteristic matter called chlorophyll, which gives the green colour to leaves, makes its appearance whenever the blanched shoots of plants are exposed to the Sun; that the petals of flowers, uncoloured while in the bud, acquire their bright tints as they unfold; and that on the outer surfaces of animals, analogous changes are induced; are wide inductions which are enough for our present purpose.

14. The extreme modifiability of organic matter by chemical agencies, is the chief cause of that active molecular rearrangement which organisms, and especially animal organisms, display. In nutrition and respiration, where the general process is a falling from a state of unstable chemical equilibrium to a state of stable equilibrium, we have the means by which the supply of materials for this active molecular rearrangement is maintained.

15. In ordinary cases of chemical action, the two or more substances concerned, themselves undergo changes of molecular arrangement; and the changes are confined to the substances themselves. But there are other cases in which the chemical action going on, does not end with the substances at first concerned; but sets going chemical actions, or changes of molecular arrangement, among surrounding substances that would else remain quiescent. And there are yet further cases in which mere contact with a substance that is itself quiescent, will cause other sub-

stances to undergo rapid metamorphoses. Indeed, the inference that some of the leading transformations occurring in the animal organism, are due to catalysis, appears necessitated by the general aspect of the facts. We know that various starchy and saccharine matters taken as food, are decomposed in their course through the body; that these matters do not become components of the tissues, but only of the fluids circulating through them; and that thus their metamorphosis is not an immediate result of the organic activities; and that their stability is such that the thermal and chemical forces to which they are exposed in the body, cannot alone decompose them. The only explanation is, therefore, that the transformation of these oxy-hydro-carbons, into carbonic acid and water, is due to communicated chemical action.

16. This division will have served its purpose if it has given a conception of the extreme modifiability of organic matter by surrounding agencies.

III. THE REACTIONS OF ORGANIC MATTER ON FORCES.

17. A rapid survey must now be taken of the redistributions simultaneously undergone by the forces acting upon organic matter; including both the immediate reactions, and those reactions mediately produced, which are among the most conspicuous of vital phenomena.

18. From organic matter, as from all other matter, incident forces call forth that reaction which is known as Heat. Just as in a burning piece of wood, the heat given out by the portion actually combining with oxygen, raises the adjacent portion to a temperature at which it also can combine with oxygen; so, in a living animal, the heat produced by oxidation of each portion of tissue, maintains the temperature at which the unoxidized portions can be readily oxidized.

19. Among the forces called forth from organisms by reaction against the actions to which they are subject, is

Light. As is shown in the phosphorescence—probably due to oxidation of the tissues—displayed by certain fungi, and comparatively common among animals.

20. There is abundant evidence that Electricity is generated during those redistributions that are ever taking place in organisms. Between different internal organs, as the liver and the stomach, there are electrical contrasts—such contrasts being greatest where the processes going on in the compared parts are most unlike.

21. To these known modes of motion, has next to be added an unknown one—a force which is unknown, in the sense that it cannot be assimilated with any otherwise recognized class. It is nerve-force. A force habitually generated in all animals, save the lowest, by incident forces of every kind. Whether we shall ever know anything more of this nerve-force, than that it is some species of molecular disturbance that is propagated from end to end of a nerve, it is impossible to say. Experiments which show that nerve-force is generated when the cut end of a nerve is either mechanically irritated, or acted on by some chemical agent, or subject to the galvanic current, prove that nerve-force is liberated by whatever disturbs the molecular equilibrium of nerve-substance. And this is all which it is necessary here to understand.

22. The most important of these reactions—that of sensible motion—remains to be noticed. Plant-life is universally accompanied by it; as we see in the circulation of the sap, in the rambling progression of *Diatomaceæ*, and in the propulsion of pollen by orchid flowers. While motion is the most distinctive character of animals; from the ciliary progression of the lowest, to the neuro-muscular of the highest. What special transformations of force generate these various mechanical changes; how the molecular movement is transformed into the movement of masses; or how the insensible motion transmitted through a nerve gives rise to sensible motion in a muscle; there is as yet no clue.

23. It only remains to add that the evolutions of force, treated of in this and the foregoing division, are rigorously dependent on the changes of matter. It is a corollary from the persistence of force, that whatever amount of power an organism expends in any shape, is the correlate and equivalent of a power that was taken into it from without.

IV. PROXIMATE DEFINITION OF LIFE.

24. To those who accept the general doctrine of Evolution, it needs scarcely be pointed out that classifications are subjective conceptions, which have no absolute demarcations in Nature corresponding to them. Consequently, on attempting to define anything complex, we can scarcely ever avoid including more than was intended, or leaving out something that should be taken in. Thus it happens that on seeking a definition of Life, there is great difficulty in finding one that is neither more nor less than sufficient. As the best mode of determining the general characteristics of vitality, let us compare its two most unlike kinds and see in what they agree.

25. Choosing *assimilation*, then, for our example of bodily life, and *reasoning* for our example of that life known as intelligence; it is first to be observed, that they are both processes of *change*. Without change, food cannot be taken into the blood nor transformed into tissue: neither can conclusions be obtained from premisses. This conspicuous manifestation of change forms the substratum of our idea of Life in general. Comparison shows this change to differ from non-vital change, in being made up of *successive* changes. The food must undergo mastication, digestion, &c.; while an argument necessitates a long chain of states of consciousness, each implying a change of the preceding state. Vital change is further distinguished by being made up of many *simultaneous* changes. Assimilation and argument both include many actions going on together. Vital changes, both visceral and cerebral, also differ from other

changes in their *heterogeneity*. Neither the simultaneous, nor the serial, acts of digestion or of ratiocination, are at all alike. They are again distinguished by the *combination* subsisting among their constituent changes. The acts that make up digestion are mutually dependent; as are those which compose a train of reasoning. Once more, they differ in being characterized by *definiteness*. Assimilation, respiration, and circulation, are definitely interdependent. These characteristics not only mark off the vital from the non-vital, but also creatures of high vitality from those of low vitality. Hence, our formula reads thus:—*Life is the definite combination of heterogeneous changes, both simultaneous and successive.* Not *a* definite combination, allowing that there may be others, but *the* definite combination.

26. This formula is however defective from omitting the most distinctive peculiarity—the peculiarity of which we have the most familiar experience, and with which our notion of Life is, more than with any other, associated. It remains now to supplement the definition by the addition of this peculiarity.

V. THE CORRESPONDENCE BETWEEN LIFE AND ITS CIRCUMSTANCES.

27. We habitually distinguish between a live object and a dead one, by observing whether a change in the surrounding conditions, is or is not followed by some perceptible and appropriate change in the object. Adding this all-important characteristic, our conception of Life becomes—The definite combination of heterogeneous changes, both simultaneous and successive, *in correspondence with external coexistences and sequences*. Some illustrations may serve to show the significance of this addition.

28. Every act of locomotion implies the expenditure of certain internal mechanical forces, adapted in amounts and directions to balance or outbalance certain external ones.

The recognition of an object is impossible without a harmony between the changes constituting perception, and particular properties coexisting in the environment. Escape from enemies supposes motions within the organism, related in kind and rapidity to motions without it. Destruction of prey requires a particular combination of subjective actions, fitted in degree and succession to overcome a group of objective ones.

29. The difference of this correspondence in inanimate and animate bodies may be expressed by symbols. Let A be a change in the environment; and B some resulting change in an inorganic mass. Then A having produced B, the action ceases. But, take a sufficiently organized living body and let the change A impress on it some change C; then, while in the environment A is occasioning *a*, in the living body C will be occasioning *c*: of which *a* and *c* will show a certain concord in time, place, or intensity. And while it is *in* the continuous production of such concords or correspondences that Life consists, it is *by* the continuous production of them that Life is maintained.

30. As, in all cases, we may consider the external phenomena as simply in relation, and the internal phenomena also as simply in relation; the broadest and most complete definition of Life will be:—*The continuous adjustment of internal relations to external relations.* It will be best, however, commonly to employ its more concrete equivalent —to consider the internal relations as "definite combinations of simultaneous and successive changes;" the external relations as "coexistences and sequences;" and the connection between them as a "correspondence."

VI. THE DEGREE OF LIFE VARIES AS THE DEGREE OF CORRESPONDENCE.

31. It is now to be remarked, that the life is high in proportion as this correspondence between internal and external relations is well fulfilled.

32. Each step upwards must consist in adding to the previously adjusted relations which the organism exhibits, some further relation parallel to a further relation in the environment. And the greater correspondence thus established, must, other things being equal, show itself both in greater complexity of life, and greater length of life—a truth which will be duly realized on remembering that enormous mortality which prevails among lowly-organized creatures, and that gradual increase of longevity and diminution of fertility which is met with on ascending to creatures of higher and higher development.

33. Those relations in the environment to which relations in the organism must correspond, increase in number and intricacy as the life assumes a higher form. This general truth is well displayed in the history of mankind; who, in the course of their progress, have been adding to their physical environment a social environment that has been growing even more involved.

34. It may here be pointed out, that those other distinctions successively noted when contrasting vital with non-vital changes (*Biology*, § 25), are all implied in this last distinction—their correspondence with external coexistences and sequences.

35. As affording the simplest and most conclusive proof that the degree of life varies as the degree of correspondence, it remains to add that perfect correspondence would be perfect life.

36. Living bodies being bodies which display in the highest degree the structural changes constituting Evolution; and Life being made up of the functional changes that accompany these structural changes; there ought to be a certain harmony between the definitions of Evolution and of Life. Such a harmony is not wanting. That maintenance of a correspondence between inner and outer relations, which we have found to constitute Life, and the perfection of which is the perfection of Life, answers completely to that state of organic moving equilibrium which

was found to arise in the course of Evolution, and which tends ever to become more complete. That two inquiries, starting from different points and carried on in different ways, should lead to conclusions so entirely harmonizing with each other, cannot fail to confirm these conclusions; if further confirmation of them be needed.

VII. THE SCOPE OF BIOLOGY.

37. We have now seen the general character of the vital Functions, and of the Matter in which they are performed. The Science of Biology becomes an account of all the phenomena attendant on the performance of such Functions by such Matter—an account of all the conditions, concomitants, and consequences, under the various circumstances fallen into by living bodies. Its subject-matter may be divided into accounts of:—

I. The Structural phenomena presented by (*a*) individual organisms, and (*b*) by successions of organisms.

II. The Functional phenomena presented by (*a*) individual organisms, and (*b*) by successions of organisms.

III. The actions of Structure on Function, and the reactions of Function on Structure: presented by (*a*) individual organisms, and (*b*) by successions of organisms.

IV. The phenomena attending the production of successions of organisms: in other words, the phenomena of Genesis.

38. For the interpretation of the first main division of Biology, there is Morphology and Embryology. The former treating of the arrangements of parts in the mature organism. The latter, of the successive modifications passed through in the development from the germ to the adult form. By contrasting the structures of organisms, there is also achieved Classification.

39. The second main division of Biology is that which is in part signified by Physiology; the remainder being what is distinguished as Psychology. Contrasting bodily and mental functions, as exhibited in various orders of or-

ganisms, shows that there exists, more or less extensively, a community of processes and methods. Hence result two groups of abstract propositions, constituting General Physiology and General Psychology.

40. The third great department of Biology comprehends the determination of functions by structures, and the determination of structures by functions. These two subdivisions of inquiry cannot in practice be carried on apart. For whichever of the two initiates the change, there goes on between them an unceasing action and reaction, producing in them co-ordinate modifications.

41. The phenomena of Genesis may be conveniently separated into three sub-divisions. The description of all the special modes whereby the multiplication of organisms is carried on. The treatment of such general questions as—What is the end subserved by the union of sperm-cell and germ-cell? And the third concerns itself simply with the different rates of multiplication in different kinds of organisms, and different individuals of the same kind.

42. The limited state of our knowledge obliges us to follow a different order to this ideal one. It will be necessary first to give an account of those empirical generalizations which naturalists and physiologists have established; arranging them with a view to facility of comprehension; and appending where possible such deductive interpretations as *First Principles* furnishes.

CHAPTER IV.

THE INDUCTIONS OF BIOLOGY.

An account, and further development, of the leading generalizations which naturalists, physiologists, and comparative anatomists have established; with such deductive interpretations as *First Principles* furnish.

I. GROWTH, OR INCREASE OF BULK.

43. Perhaps the widest and most familiar induction of Biology is that organisms grow. While, however, this is a characteristic so habitually and markedly displayed by plants and animals, as to be carelessly thought peculiar to them, it is really not so. Under appropriate conditions, increase of size takes place in inorganic aggregates, as well as in organic aggregates. Crystals grow; and often more rapidly than living bodies. Growth is indeed a concomitant of Evolution; and if Evolution of one kind or other is universal, growth is universal—universal, that is, in the sense that all aggregates display it in some way at some period. The several conditions by which the phenomena of organic growth are governed, conspiring and conflicting in endless different ways and degrees, qualify more or less differently each other's effects. Hence the following generalizations must be taken as true on the average, or, other things equal, first, that growth being an integration with the organism, of such environing matters as are of like nature with the matters composing the organism, its growth is dependent on the available supply of such matters. Second, that the available supply of assimilable matters being the same, and other conditions not dissimilar, the degree of growth varies according to the

surplus of nutrition over expenditure. Third, that in the same organism the surplus of nutrition over expenditure is a variable quantity; and that growth is unlimited or has a definite limit, according as the surplus does or does not progressively decrease. A proposition exemplified by the unceasing growth of organisms that do not expend force; by the growth, slowly diminishing but never completely ceasing, of organisms that expend comparatively little force; and by the definitely limited growth of organisms that expend much force. Fourth, that among organisms which are large expenders of force, the size ultimately attained is, other things equal, determined by the initial size. Fifth, that where the likeness of other circumstances permits a comparison, the possible extent of growth depends on the degree of organization: an inference testified to by the larger forms among the various divisions and sub-divisions of organisms. Can these general relations which induction leads us to, be deductively established?

44. That there must exist a certain dependence of growth on organization, may be shown *a priori*. It cannot be questioned that a more complex animal, capable of adjusting its conduct to a greater number of surrounding contingencies, will be the better able to secure food and evade damage, and so to increase bulk. And evidently, a large animal, living under such complex conditions of existence as everywhere obtain, is not possible without comparatively high organization.

45. Deduction shows to be necessary, as induction makes familiar, the truths that, the value of food for purposes of growth depends not on the quantity of the various organizable materials it contains, but on the quantity of the material most needed; that, given a right proportion of the materials, the pre-existing structure of the organism limits their availability; and that that the higher the structure, the sooner is this limit reached.

46. Why should not all organisms, when supplied with

sufficient materials, continue to grow as long as they live? We have found that organisms are mostly built up of compounds which are stores of force (*Biology*, §§ 1-23.). These substances being at once the materials for organic growth, and the sources of organic force; it follows, from the persistence of force, that growth is substantially equivalent to the absorbed nutriment, minus the nutriment used up in action. This, however, does not account for the fact, that in every domestic animal the increments of growth bear continually decreasing ratios to the mass, and finally come to an end. Nevertheless, it is demonstrable that the excess of absorbed over expended nutriment, must decrease as the size increases. Since, in similar bodies, the areas vary as the squares of the dimensions, and the masses vary as the cubes; it follows that however great the excess of assimilation over waste, may be during the early life of an active organism, there must be reached, if the organism lives long enough, a point at which the surplus assimilation is brought to nothing—a point at which expenditure balances nutrition—a state of moving equilibrium.

47. Obviously this antagonism between accumulation and expenditure, must be a leading cause of the contrasts in size between allied organisms that are in many respects similarly conditioned. The causes affecting growth are so numerous however, as to prohibit its inductive establishment.

48. We now come to many marked contrasts in growth that are not due to any of the foregoing causes. For example, an ox immensely exceeds a sheep in mass. Yet the two live from generation to generation in the same fields, eat the same grass and turnips, obtain these aliments with the same small expenditure of force, and differ scarcely at all in their degrees of organization. Whence arises, then, their striking unlikeness of bulk? It arises from a calf and a lamb commencing their physiological transactions on widely different scales; their first increments of growth are similarly contrasted in their amounts; and the two

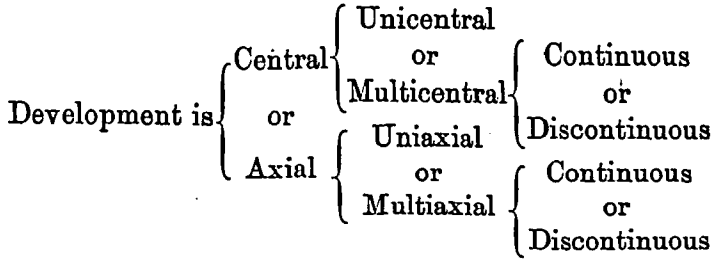
diminishing series of such increments, end at similarly-contrasted limits—the sum-totals of analogous diminishing series depending upon the amounts of their initial terms.

49. Such are the several conditions upon which the phenomena of growth depend. As they in every case qualify more or less differently each other's effects, each generalization must be taken as true on the average, or other things being equal.

II. DEVELOPMENT, OR INCREASE OF STRUCTURE.

50. Our general conceptions of Development will be aided by an approximate classification of its modes. Development is primarily *central*. All organic forms of which the entire history is known, set out with a symmetrical arrangement of parts round a centre. According as the germ product develops symmetrically round one centre, or in subordination to many centres, it becomes *unicentral*, an uncommon form, or *multicentral*. Multicentral development is divisible into *continuous* and *discontinuous*, as the whole product of a germ coheres in one mass, as it does in the lichens, or as it does not, in the *Protozoa*. From these forms we pass almost insensibly to that higher kind called *axial*, manifested alike in Endogens, Exogens, Cœlenterates, and Vertebrates. As before, the whole germ product may arrange itself round one, or round many axes—may be *uniaxial*, as in *Fungi*, *Algæ*, and the higher animals; or *multiaxial*, as in *Cœlenterata* *Molluscoida*, and the shrubs and trees. This latter may be either *continuous* or *discontinuous*: the parts having different axes may continue united, or may separate. The garden plants, and the compound *Hydrozoa* and *Actinozoa* showing the former; the fresh-water polype, and the strawberry with its bud-bearing shoots, the latter. Though Evolution renders an arrangement free from anomalies impossible, the following rough grouping of the facts will

be of service when we come to treat of Individuality and Reproduction:—



51. The internal and more special aspects of organic development may now be dealt with. In each of the organic sub-kingdoms the change from an incoherent, indefinite homogeneity, to a coherent, definite heterogeneity, is illustrated in a quadruple way. The originally-like units or cells, become unlike in various ways, and in ways more numerous and marked as the development goes on. The several tissues which these several classes of cells form by aggregation, grow little by little distinct from each other; and little by little become structurally complex. In the shoot, as in the limb, the external form, originally very simple, and having much in common with countless simple forms, organic and inorganic, gradually acquires an increasing complexity, and an increasing unlikeness to other forms. And meanwhile, the remaining parts of the organism having been severally assuming structures divergent from each other and from that of this particular shoot or limb, there has arisen a greater heterogeneity in the organism as a whole.

52. The most remarkable induction of von Baer comes next in order. It is that in its earliest stage, every organism has the greatest number of characters in common with all other organisms in their earliest stages; that at each subsequent stage, traits are acquired which successively distinguish the developing embryo from groups of embryos that it previously resembled—thus step by step diminishing the group of embryos which it still resembles; and that thus the class of similar forms is finally narrowed to the species of which it is a member. For example, the

human germ, primarily similar to all others, first differentiates from vegetal germs, then from invertebrate germs, and subsequently assumes the mammalian, placental, unguiculate, and lastly the human, characters.

53. Along with the progressing differentiation of each organism from others, there is a progressing differentiation of it from its environment; like that progressing differentiation from the environment which is met with in the ascending forms of life. On contemplating the various grades of organisms in their ascending order, we find them, as a general truth, more and more distinguished from their inanimate media, in *structure*, in *form*, in *chemical composition*, in *specific gravity*, in *temperature*, and in *self-mobility*. In proportion as an organism is physically like its environment, does it remain a passive partaker of the changes going on in its environment; while in proportion as it is endowed with powers of counteracting such changes, it exhibits greater unlikeness to its environment. If now, from this same point of view, is considered the relation borne to its environment by any superior individual organism in its successive stages, there is an analogous series of contrasts. Thus it may be said that the development of an individual organism, is at the same time a differentiation of its parts from each other, and a differentiation of the consolidated whole from the environment; and that in the last as in the first respect, there is a general analogy between the progression of an individual organism, and the progression from the lowest orders of organisms to the highest orders.

54. Dealing deductively with some aspects of these inductions, it is readily seen that development is a change from incoherent, indefinite homogeneity, to coherent, definite heterogeneity. Also, that just in the same way that the growth of an entire organism is carried on by abstracting from the environment substances like those composing the organism; so the production of each organ within the organism, is carried on by abstracting from the substances

contained in the organism, those required by this particular organ. A selective assimilation illustrating the general truth that like units tend to segregate; and that the pre-existence of a mass of certain units, produces, probably by polar attraction, a tendency for diffused units of the same kind to aggregate with this mass, rather than elsewhere.

III. FUNCTION.

55. Prof. Huxley has remarked of the lowest Rhizopods, which present no distinctions of parts, and nevertheless feed and grow and move about, that they exhibit Life without organization. Consequently, Function must be regarded as taking precedence of Structure, and not Structure of Function.

56. Function may be classed as *statical*, as that of the skeleton, or *dynamical*, as that of nutrition. From another point of view, Function is divisible into three most general divisions; the *accumulation of force* (latent in food); the *expenditure of force* (latent in the tissues and certain matters absorbed by them); and the *transfer of force* (latent in the prepared nutriment or blood) from the parts which accumulate to the parts which expend.

57. The first induction to be here set down, is the familiar and obvious one, that complexity of function, is the correlative of complexity of structure.

58. It is a generalization almost equally obvious with the last, that functions, like structures, arise by progressive differentiations. Just as an organ is first an indefinite rudiment, having nothing but some most general characteristic in common with the form it is ultimately to take; so a function begins as a kind of action that is like the kind of action it will eventually become, only in a very vague way. And in functional development, as in structural development, the leading trait thus early manifested, is followed successively by traits of less and less importance. This holds equally throughout the ascending grades of

organisms, and throughout the stages of each organism. This progress from simple to complex kinds of action, has been aptly termed by Milne-Edwards, the "physiological division of labour."

59. Fully to understand this change from homogeneity to heterogeneity of function, which accompanies the change from homogeneity to heterogeneity of structure, it is needful to contemplate it under a converse aspect. At the same time that functions are being differentiated, they are also being integrated. While in well-developed creatures the distinction of functions is very marked, the combination of functions is very close. From instant to instant, the aeration of blood implies that certain respiratory muscles are being made to contract by certain nerves; and that the heart is duly propelling the blood to be aerated. That the heart may act, it must from instant to instant be excited by discharges from certain ganglia; and the discharges from these ganglia are made possible, only by the conveyance to them, from instant to instant, of the blood which the heart propels.

60. The physiological division of labour, is usually not carried so far as wholly to destroy the primary physiological community of labour. As in societies the adaptation of special classes to special duties, does not entirely disable these classes from performing each other's duties on an emergency; so in organisms, tissues and structures that have become fitted to the particular offices they have ordinarily to discharge, often remain partially able to discharge other offices. It must be said, however, that the ability to resume the primordial community of function, varies inversely as the established specialization of function; and that it disappears when the specialization of function becomes great.

61. If the number of different parts in an aggregate must determine the number of differentiations produced in the forces passing through it—if the distinctness of these parts from each other, must involve distinctness in their

reactions, and therefore distinctness between the divisions of the differentiated force; there cannot but be a complete parallelism between the development of structure and the development of function. If structure advances from the simple and general to the complex and special, function must do the same.

IV. WASTE AND REPAIR.

62. Passing over Waste and Repair in the vegetal kingdom as insignificant; we find in the animal kingdom that Waste is inconsiderable in creatures that produce but little of the insensible and sensible motion we call heat and muscular movement, as in the *Actiniæ:* and that it becomes conspicuous in those that produce much, as in the *Mammalia.* In the same creature there is most waste where most motion is generated. Though Waste and Repair vary in their relative rates, both are constantly going on. During activity, the reintegration falls in arrear of the disintegration; until, as a consequence, functional languor, ending in quiescence, permits the reintegration to exceed the disintegration, and restore the parts to their integrity. With Waste and Repair, as wherever there are antagonistic actions, there are rhythmical divergences on opposite sides of the medium state—changes which equilibrate each other by their alternate excesses. (*First Principles,* § § 85, 173.) Function carried to excess, may produce waste so great, that repair cannot make up for it during the ordinary periods of rest; and there may result permanent incapacities. The repair of, or power of reproducing, injured or lost parts, is greatest where the organization is lowest, and almost disappears where it is highest: as is seen in the *Hydra,* any portion of which can produce the rest; while in mammals and birds, wounds only are often but imperfectly healed.

63. There is a very obvious and complete harmony between the first of the above inductions, and the deduc-

tion that follows immediately from first principles. The relation between the activity of a special part and the waste of that part may also be deductively inferred; though it cannot be inferred that this relation is equally definite.

64. Deductive interpretation of the phenomena of Repair is by no means easy. The repair of a wasted tissue may, however, be considered as due to forces analogous to those by which a crystal reproduces its lost apex, when placed in a solution like that from which it was formed. In the case of the crystal, this reintegration is ascribed to polarity—a power of whose nature we know nothing. Whatever be its nature, it is probable that the power by which organs repair themselves from the nutritive matters circulating through them, is of the same order.

65. The ability of an organism to recomplete itself when one of its parts has been cut off—as in the growth of a lizard's leg after amputation, or in the development of a Begonia from a leaf fragment—is of the same order as the ability of a broken crystal to recomplete itself. For this property there is no fit term. If we substitute for the circuitous expression—the power which certain units have of arranging themselves into a special form—we may, without assuming anything more than is proved, use the term organic polarity, or polarity of the organic units, to signify the proximate cause of the ability which organisms display of reproducing lost parts.

66. What are these organic units? The polarity cannot dwell in the *chemical units*, the proximate chemical compounds of organic bodies—the atoms of albumen, &c.—for in such case, there would be nothing to account for the unlikenesses of different organisms. Nor can it reside in the cell, for it is not universally coexistent with this, the *ntorphological unit.* We must suppose that the chemical units combine into units immensely more complex than themselves, complex as they are; and that in each organism, these *Physiological Units* produced by this further compounding of highly compound atoms, have a more or less

distinctive character. We must conclude that in each case, some slight difference of composition in these units, leading to some slight difference in their mutual play of forces, produces a difference in the form which the aggregate of them assumes.

V. ADAPTATION.

67. Organs that have arrived at their full size, possess a certain modifiability; so that while the organism as a whole, retains pretty nearly the same bulk, the proportions of its parts may be considerably varied. Their variations, here treated under the title Adaptation, depend on specialities of individual action. We have just seen that the actions of organisms entail reactions on them; and that specialities of action entail specialities of reaction. Here it remains to be pointed out, that the special actions and reactions do not end with temporary changes, but work permanent changes. If, in an adult animal, the waste and repair in all parts were exactly balanced, it is clear that there would occur no change in the relative sizes of organs. But there is no such exact balance. If the excess of function, and consequent excess of waste, is moderate, it is not simply compensated by repair, but more than compensated—there is a certain increase of bulk. The growth of muscles exercised to an unusual degree, is a matter of common observation. There is the equally general truth, that beyond a limit, usually soon reached, very little, if any, further modification can be produced. After a time, no training makes the athlete any stronger. It has also to be noted that the limited increase of size produced in any organ, is not maintained unless the increase of function is permanent. Legs strengthened by a pedestrian tour, become weak again after a prolonged return to sedentary life. It is observable, too, that the rapidity and completeness with which an artificial power is lost, is proportionate to the shortness of the cultivation which evoked it.

68. Why an organ exerted somewhat beyond its wont,

should presently grow, and thus meet increase of demand by increase of supply, is not obvious. Such answer to this question as we may hope to find, must be looked for in the effects wrought on the organism as a whole, by increased function in one of its parts. Additional work given to a muscle, implies additional work to the arteries, absorbents, and nerves, which results in temporarily-increased efficiency and in an assimilation in excess of that required.

69. Why do these adaptive modifications in an individual animal, soon reach a limit? And why, in the descendants of such animals, similarly conditioned, is this limit very slowly extended? The connexion of cause and consequence is here more manifest than in the foregoing paragraph. For it must be remembered that in a mature animal, or one which has reached a balance between assimilation and expenditure, there cannot be an increase in the nutrition of some organs, without a decrease in the nutrition of others; and an organic establishment of the increase, implies an organic establishment of the decrease—implies more or less change in the processes and structures throughout the entire system. And here is disclosed one reason why growing animals undergo adaptations so much more readily than adult ones. For while there is surplus nutrition, it is possible for specially-exercised parts to be specially enlarged, without any positive deduction from other parts. There is required only that negative deduction, shown in the diminished growth of other parts.

70. That organisms and species soon return to their original structures, when restored to their original conditions, follows from the foregoing explanations. For we have seen that the condition of the specially-modified part cannot for a very long time be in equilibrium with the rest. The remotely-affected organs, as yet but little changed, will, in the absence of the perturbing cause, resume their previous actions. The parts that depend on them, will consequently by and by do the same. Until at length, by a reversal of the adaptive process, the organ will be brought back almost

to its original state. The comparative stability of organic types may be inferred from this.

71. As thus understood, the phenomena of adaptation fall into harmony with first principles.

VI. INDIVIDUALITY.

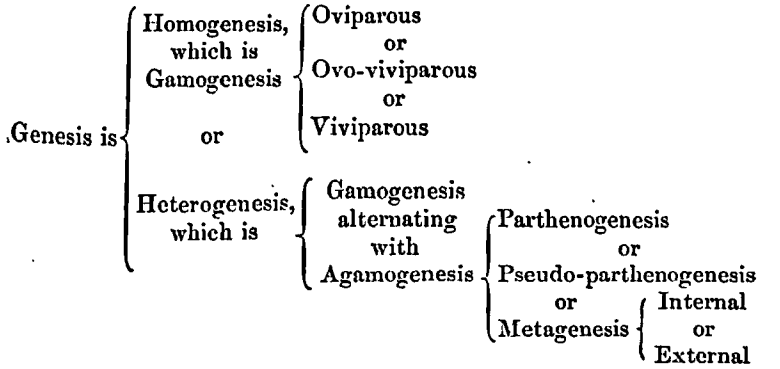
72. What is an individual? It is, indeed, usual to speak of a tree with its many branches and shoots, as singular; but there are strong reasons for considering it as plural. Are the young polypes, furnished with separate mouths and tentacles, but having a common alimentary canal, distinct individuals or not? On the hypothesis of Evolution, perplexities of this nature are just such as might be anticipated. If Life in general, commenced with minute and simple forms; and if the transitions from these primordial units to organisms made up of groups of such units, took place by degrees; it is clear that individualities of the first and simplest order, would merge gradually in those of a larger and more complex order, and these again in others of an order having still greater bulk and organization; and that hence it would be impossible to say where the lower individualities ceased, and the higher individualities commenced.

73. Shall the whole product of a single fertilized germ, whether concrete or discrete, be regarded as a single individual? If so, it is to apply the term inconveniently to separate living bodies. While, to apply it to fully-developed organisms reproducing their kind after the ordinary sexual method, is to commit ourselves to the anomalous position of denying to many orders of animals the possession of any individuals.

74. There is, indeed, as already implied, no definition of individuality that is unobjectionable. We must be content with a course which commits us to the smallest number of incongruities; and this course is, to consider as an individual, any centre or axis that is capable of independently carrying on that continuous adjustment of inner to outer relations which constitutes Life.

VII. GENESIS.

75. The title Genesis, being less specialized than either generation or reproduction, is here chosen to express the multiplication of individuals. Genesis may be sub-divided into two fundamentally distinct processes: One, called *Homogenesis*, or *Gamogenesis*, in which the successive generations are alike, and the genesis always sexual; the other, *Heterogenesis*, in which the successive generations are unlike, and the genesis asexual with the sexual only occasionally recurring. In every species which multiplies by *homogenesis*, each generation and every succeeding generation consists of males and females; and the fertilized germ gives rise to but one individual. Its prominent divisions are the *Oviparous*, as in birds; the *Viviparous*, as in mammals; and the intermediate *Ovo-viviparous*, as in scorpions. In *Heterogenesis*, asexual genesis, or *agamogenesis*, is interrupted more or less frequently by *gamogenesis;* from a generation of perfect males and females arise individuals that are neither males nor females, but that produce the next generation from buds, many individuals thus originating from a single fertilized germ. It may be sub-divided into *Parthenogenesis*, where, along with gamogenesis, is a form of agamogenesis exactly like it, save in the absence of fecundation—reproduction is carried on by virgin mothers. *Metagenesis*, where in agamogenesis the new individuals bud out, not from any specialized reproductive organs, but from unspecialized parts of the parent. If the individuals thus produced, grow from the outsides of the parents—the metagenesis is external; if from the insides, the metagenesis is internal. And *Pseudo-parthenogenesis*, intermediate between the two, being agamogenesis carried on in a reproductive organ, a process familiarly exemplified in the *Aphides*. Hence, the following is given as an approximation to the insensible graduations of Evolution:—



76. Genesis under every form, is a process of negative or positive disintegration; and is thus essentially opposed to that process of integration, which is one element of individual evolution. Negative disintegration occurs in those cases where, as among the compound *Hydrozoa*, there is a continuous development of new individuals by budding from the bodies of older individuals; and where the older individuals are thus prevented from growing to a greater size, or reaching a higher degree of integration. Positive disintegration occurs in those cases of agamogenesis where the formation of new individuals is discontinuous, and in all cases of gamogenesis. The degrees of disintegration are various.

77. Under all its various forms, the essential act in gamogenesis is the union of two centres or cells, produced by different parent organisms: the sperm-cell being the male product, and the germ-cell the female. There are very many modes and modifications of modes in which these cells are produced; very many modes and modifications of modes by which they are brought into contact; and very many modes and modifications of modes by which the resulting fertilized germs have secured to them the fit conditions for their development. Passing over the variable concomitants of gamogenesis, and confining our attention to what is constant in it, we find:—that there is habitually, if not universally, a fusion of two

portions of organic substance, which are either themselves distinct individuals, or are thrown off by distinct individuals; that these portions of organic substance, which, contrary to what might be expected, are severally distinguished by their low degree of specialization, have arrived at states of structural quiescence or equilibrium; that if they are not united, this equilibrium ends in dissolution; but that by the mixture of them, this equilibrium is destroyed, and a new evolution initiated.

78. What are the conditions under which Genesis takes place? How does it happen that some organisms multiply by homogenesis, and others by heterogenesis? Why is it that where agamogenesis prevails, it is usually from time to time interrupted by gamogenesis? These are questions of extreme interest; but questions to which decisive answers cannot yet be given. In the existing state of Biology, we must be content to learn the direction in which the answers lie. A survey of the facts, discloses certain correlations which, if not universal, are too general to be without significance. The general law to which both homogenesis and heterogenesis conform, appears to be, that the products of a fertilized germ go on accumulating by simple growth, so long as the forces whence growth results are greatly in excess of the antagonist forces; but that when diminution of the one set of forces, or increase of the other, causes a considerable decline in this excess, and an approach towards equilibrium, fertilized germs are again produced. Whether the germ-product be organized round one axis, or round the many axes that arise by agamogenesis—whether the development be continuous or discontinuous, matters not. Whether, as in concrete organisms like the higher animals, this approach to equilibrium results from that disproportionate increase of expenditure entailed by increase of size, (*Biology*, § 46); or whether, as in partially and wholly discrete organisms, like most plants and many inferior animals, this approach to equilibrium results from absolute or relative decline of nutrition, matters not. In any case,

the recurrence of gamogenesis is associated with a more or less marked decrease in the excess of tissue-producing power. It cannot be said, indeed, that a decrease in this excess always results in gamogenesis; for there is evidence to the contrary, in the fact that some organisms multiply for an indefinite period by agamogenesis only. What must be said, is, that an approach towards equilibrium between the forces which cause growth and the forces which oppose growth, is the chief condition to the recurrence of gamogenesis; but that there are other unknown conditions, in the absence of which this approach to equilibrium is not followed by gamogenesis.

79. The question has yet to be answered—*Why* does gamogenesis recur? Seeing on the one hand, that gamogenesis recurs only in individuals that are approaching towards a state of organic equilibrium; and seeing, on the other hand, that the sperm-cells and germ-cells thrown off by such individuals, are cells in which developmental changes have ended in quiescence, but in which, after their union, there arises a process of active cell-formation; we may suspect that the approach towards a state of general equilibrium in such gamogenetic individuals, is accompanied by an approach towards molecular equilibrium in them; and that the need for this union of sperm-cell and germ-cell, is the need for overthrowing this equilibrium, and re-establishing active molecular change in the detached germ—a result which is probably effected by mixing the slightly different physiological units of slightly different individuals. "Natural Selection" will continually tend to determine the period at which gamogenesis commences; and also, the most advantageous proportion of males and females.

VIII. HEREDITY.

80. Understood in its entirety, the law of hereditary transmission is that each plant or animal produces others of like kind with itself: the likeness of kind consisting, not so much in the repetition of individual traits, as in the assump-

tion of the same general structure. That every unfolding organism eventually takes the form of the class, order, genus, and species from which it sprang; is a fact which, by force of repetition, has acquired in our minds almost the aspect of a necessity. The illustrations of Heredity are divisible into two classes. In the one class come cases where congenital peculiarities, not traceable to any obvious causes, are bequeathed to descendants. In the other class come cases where the peculiarities thus bequeathed are not congenital, but have resulted from changes of functions during the lives of the individuals bequeathing them. The former class will first be considered.

81. When there are thousands of men whose profit or loss depends on the truth of the inferences they draw from simple and perpetually-repeated observations; and when it is found that the inference arrived at, and handed down from generation to generation of these deeply-interested observers, has become an unshakeable conviction; we may accept it without hesitation. In breeders of animals there is such a class, led by such experiences, and entertaining such a conviction—the conviction that minor peculiarities of organization are inherited as well as major peculiarities. Hence the immense prices given for successful racers, and the careful record of pedigrees. The inheritance of such diseases as gout, consumption, and insanity, is universally admitted.

82. To prove the transmission of those structural peculiarities that have resulted from functional peculiarities, is comparatively difficult. We are restricted to cases with which natural or artificial selection can have had nothing to do; and such cases are difficult to find. Some, however, may here be noted. The best examples occur in the human race. It is notorious that, in the United States, the descendants of the immigrant Irish lose their Celtic aspect, and become Americanized. This cannot be ascribed to intermarriage with Americans, since this is inconsiderable in amount. Equally marked is the case of the immigrant

Germans, who, though they keep themselves very much apart, rapidly assume the prevailing type. Special modifications may also be noted. That large hands are inherited by men and women whose ancestors led laborious lives; and that men and women whose descent, for many generations, has been from those unused to manual labour, commonly have small hands; are established opinions. The clearest proof that structural alterations caused by alterations of function, are inherited, occurs when the alterations are morbid. It is well known that in persons previously healthy, consumption may be produced by unfavourable conditions of life—by bad and insufficient food; by foul, damp, unventilated habitations; and even by long-continued anxiety. It is still more notorious that the consumptive diathesis is conveyed from parent to child.

83. Mention must not be omitted of the reappearance in offspring, of traits not borne by the parents, but borne by the grandparents or by remoter ancestors—Atavism. And the limitation of Heredity by sex—the restriction of certain transmitted peculiarities to offspring of the same sex as the parent possessing these peculiarities.

84. We must conclude that the likeness of any organism to either parent, is conveyed by the special tendencies of the physiological units derived from that parent. In the fertilized germ there are two groups of physiological units, slightly different in their structures. Throughout the process of evolution, the two kinds of units, mainly agreeing in their polarities and in the form into which they tend to build themselves, but having minor differences, work in unison to produce an organism of the species from which they were derived, but work in antagonism to produce copies of their respective parent-organisms. And hence ultimately results an organism in which traits of the one are mixed with traits of the other. It involves a denial of the persistence of force to say that the structure of a parent may be changed by alterations of function, and yet beget off-

spring exactly like those it would have begotten, had it not been so changed.

IX. VARIATION.

85. Equally conspicuous with the truth that every organism bears a general likeness to its parents, is the truth that no organism is exactly like either parent. No two plants are indistinguishable; and no two animals are without differences. Variation is coextensive with Heredity. The transmission of variations is itself variable; it varies both in the direction of decrease and of increase. An individual trait of one parent, may be so counteracted by the influence of the other parent, that it may not appear in the offspring; or not being so counteracted, the offspring may possess it, perhaps in an equal degree or perhaps in a less degree; or the offspring may exhibit the trait in even a still higher degree.

86. Induction points to three causes of variation, all in action together. There is heterogeneity among progenitors, which, did it act uniformly and alone in generating new deviations, would impress such new deviations to the same extent on all offspring of the same parents; which it does not. There is functional variation in the parents, which, acting either alone or in combination with the preceding cause, would entail like variations on all young ones simultaneously produced; which it does not. And there is consequently some third cause of variation, yet to be found, which acts along with the structural and functional variations of ancestors and parents.

87. The uniformity of wild, and the multiformity of domesticated species, implies a relation between variation and the action of external conditions. If change of conditions is the only known cause by which the original homogeneity of a species is destroyed; and if change of conditions can affect an organism only by altering its functions; it follows that alteration of function is the only known

internal cause to which the commencement of variation can be ascribed.

88. Can we account for the "spontaneous variation" of new individuals simultaneously produced by the same parents—animals of the same litter? In *First Principles*, § 149, we saw that no two parts of any aggregate being subject to the same forces, they must become more or less dissimilar. Hence, no two ova, spermatozoa, or pollen-cells, can be identical. In every case, the small initial difference in the proportions and conditions of the slightly-unlike physiological units, will lead, during evolution, to a continual multiplication of differences, generating sensible divergences at the conclusion. This initial difference is again increased by the segregation which inevitably goes on in any mixed aggregate of units, and prevents a homogeneous mean between the two parents. (*First Principles*, § 163.)

89. There is a further cause of variation in the fact that each parent had parents that were more or less contrasted. Each parent inherits at least two orders of dissimilar physiological units: has not a homogeneous constitution, as, for simplicity, we have so far assumed. The general law of probabilities shows that, while these involved influences will usually neutralize one another, at rare intervals there must result such combinations as will produce very marked divergences.

90. To what cause can be attributed the supposed heterogeneity among the physiological units of different individuals of the same species? It is to the fact that each member of a species whose circumstances have been altered will not be similarly affected; without absolute uniformity in the individuals, the induced functional changes, and hence the units, must be more or less dissimilar.

91. Variation necessarily follows from the persistence of force. For the members of a species must be subject to dissimilar aggregates of forces in the whole of the area they inhabit—they must become different in themselves and

in their progeny; for to say that differences in the forces will not produce differences in the effects, is to deny the persistence of force. We must say that in all cases, adaptive change of function is the primary and ever-acting cause of that change of structure which constitutes variation; and that the variation which appears to be "spontaneous" is derivative and secondary.

X. GENESIS, HEREDITY, AND VARIATION.

92. Let us now resume the question already hypothetically answered (*Biology*, § § 78, 79). Why does Gamogenesis recur? Among physiological units, as among units of a simpler order, imperfect similarity must entail imperfect polar balance, and consequent diminished ability to withstand disturbing forces. Hence, given two organisms which, by diminished nutrition or increased expenditure, are being arrested in their growths—given in each an approaching equilibrium between the forces of the units and the forces of the aggregate—given, that is, such a comparatively-balanced state among the units, that rearrangement of them by incident forces is no longer so easy; and it will follow that by uniting a group of units from the one organism with a group of slightly-different units from the other, the tendency towards equilibrium will be diminished, and the mixed units will be rendered more modifiable in their arrangements by the forces acting on them; they will be so far freed as to become again capable of that redistribution which constitutes evolution. What power does this hypothesis give for interpreting established inductions?

93. The fact that, in hermaphrodite plants and animals there are elaborate appliances to prevent the germ-cells of one individual being fertilized by the sperm-cells of the same individual, tends to show, as the hypothesis implies, that the essential thing in fertilization is the union of specially-fitted portions of *different* organisms.

94. This would seem to involve the impossibility of that self-fertilization which occurs in certain plants and *Entozoa*. It arises here, however, from the segregation, noticed in the last division (*Biology*, § 89), of the different orders of physiological units inherited from different parents and different lines of ancestry. The conclusion, based wholly on observed facts, that self-fertilization is at the best comparatively inefficient, and loses all efficiency in course of time, is thus to be expected; for such contrasts as originally existed among the physiological units are by self-fertilization progressively obliterated, and the segregation of the different units rendered impossible. The fertility will gradually diminish, and the series will finally die out.

95. Is there not here, also, an evident solution of the current belief of breeders, that animals and plants have more vigour and fertility when the offspring of a cross between different varieties or strains? and that these same qualities are diminished by close interbreeding? A conclusion harmonizing with the prevalent belief respecting family intermarriages in the human race.

96. Gamogenesis is also a means of turning to positive advantage, the individual differentiations which, in its absence, would result in positive disadvantage. Were it not that individuals are ever being made unlike each other by their unlike conditions, there would not arise among them those contrasts of molecular constitution, needful for producing the fertilized germs of new individuals. And were not these individual differentiations ever being mutually cancelled, they would end in a fatal narrowness of adaptation.

97. The power of this hypothesis of physiological units to explain so many phenomena, and to bring under a common bond phenomena that seem so little allied, is strong evidence of its truth. Especially on observing that it brings the facts of Genesis, Heredity, and Variation, into harmony with first principles. When we see that these plastic physiological units, which we find ourselves obliged

to assume, are just such more integrated, more heterogeneous, more unstable, and more multiform atoms, as would result from continuance of the steps through which organic matter is reached—when we see that the differentiations of them assumed to occur in differently-conditioned aggregates, and the equilibrations of them assumed to occur in aggregates which maintain constant conditions, are but corollaries from the persistence of force—when we see that the maintenance of life in the successive generations of a species, becomes a consequence of the continual incidence of new forces on the species, to replace the forces that are ever being rhythmically equilibrated in the propagation of the species—and when we thus see that these apparently exceptional phenomena displayed in the multiplication of organic beings, fall into their places as results of the general laws of Evolution; there are weighty reasons for entertaining the hypothesis which affords this interpretation.

XI. CLASSIFICATION.

98. Classification may be employed to facilitate identification, as when books are arranged in the alphabetical succession of the author's names: or, to organize our knowledge, as when they are arranged according to their subject-matter—Mathematics, History, &c. The first classifications are groupings of objects that resemble each other in easily-perceived attributes. While the classifications eventually arrived at, serve most completely to identify the things, and also to express the greatest amount of knowledge concerning the things—enable us to predicate the greatest number of facts concerning each thing; and by so doing prove that they express the most precise correspondence between our conceptions and the realities.

99. Biological classifications illustrate well the phases through which classifications in general pass. There is at first, a guidance by conspicuous and simple characters, and a tendency towards arrangement in linear order; then,

more regard to combinations of characters which are essential but often inconspicuous; and an arrangement in divergent groups and re-divergent sub-groups. In botanical classification, at the present time, linear arrangement has disappeared: there is a breaking up into groups and sub-groups and sub-sub-groups, which do not admit of being placed in serial order, but only in divergent and re-divergent order. Each successively smaller class thus has an increased number of coexisting attributes.

100. Like the modern classification of plants, the classification of animals that has now been arrived at, is one in which the linear order is completely broken up. Taking the classification of Prof. Huxley, we find that the relations among the several great groups of the animal kingdom—the *Protozoa, Cœlenterata, Annulosa, Mollusca,* and *Vertebrata*—are represented diagrammatically by placing these groups at the end of five radii of varied lengths, diverging at different angles from a centre. Each group resolves itself into a cluster of clusters, arranged in like manner, radially, and at diverse angles and distances from each sub-centre, to represent the successively subordinate divisions of classes, orders, &c. By the distances of the great divisions from the general centre, are rudely symbolized their respective degrees of divergence from the form of simple, undifferentiated, organic matter; which may be regarded as their common source. Within each group, the remoteness from the local centre represents, in a rough way, the degree of departure from the general plan of the group. No diagram, however, can give a correct conception. Even supposing a diagram represented the relations of animals to one another as truly as they can be expressed on a plane surface, (which of course it cannot,) it would still be inadequate. Such relations cannot be represented in space of two dimensions; but only in space of three dimensions.

101. Classifications becoming more and more natural, has led to the erroneous idea that species, genera, orders, and classes, are assemblages of definite values. We must

remember, however, that it is not so. While our successively subordinate groups have a certain general correspondence with the realities, they inevitably give to the realities a regularity which does not exist.

102. A general truth of much significance is exhibited in these classifications. We see that, speaking generally, the successively smaller groups are distinguished from one another by traits of successively less importance, physiologically considered. The attributes possessed in common by the largest assemblages of organisms, are few in number but all-essential in kind: they affect fundamentally the most vital actions. Each secondary assemblage, included in one of the primary assemblages, is characterized by further common attributes that influence the functions less profoundly. And so on with each lower grade of assemblage.

103. What is the meaning of these peculiar relations of organic forms? The law of probabilities negatives the belief that they could have arisen fortuitously. They cannot be necessary, in the sense that all other combinations are impracticable. To ascribe them to design is but to suggest other difficulties. In the next chapter will be shown what is the only possible solution.

XII. DISTRIBUTION.

104. The distribution of organisms in Space may be considered in two ways—their restriction to environments appropriate to them; and their absence from localities for which they are well fitted.

105. Facts which illustrate the limiting influence of surrounding conditions, are abundant, and familiar to all readers. Fully to understand the actions of the inorganic and organic agencies, that set bounds to the spaces which organisms of each species inhabit, they must be contemplated as working not separately, but in concert. We have to conceive the forces by which the limit is maintained, as

including all physical and meteorologic influences, united with the influences, direct or more or less remote, of nearly all coexisting organisms. One general truth calls for special notice—the truth that organisms are ever intruding on each other's spheres of existence. That tendency which the human races display, to overrun and occupy each other's lands, is a tendency exhibited by all classes of organisms in all varieties of ways. The bounds to the sphere of existence of each species, must be regarded as determined by the balancing of two antagonist sets of forces. The tendency which every species has to intrude on other areas, on other modes of life, and other media, is restrained by the direct and indirect resistance of conditions, organic and inorganic. And these expansive and repressive energies, varying continually in their respective intensities, rhythmically equilibrate each other—maintain a limit that perpetually oscillates from side to side of a certain mean.

106. The absence of organisms from localities for which they are well fitted is accounted for, and the supposition of any predetermined adaptation abolished, when we see that the similar areas peopled by dissimilar forms, are those between which there are impassable barriers; while the dissimilar areas peopled by similar forms, are those between which there are no such barriers. The foregoing truth, that each species of organism tends ever to expand its sphere of existence until it reaches limits that are for the time insurmountable, thus answers our second question of distribution.

107. Our knowledge of the distribution of organic forms in Time, being derived wholly from the evidence afforded by fossils, is limited to that geologic time of which some records remain: it cannot extend to those pre-geologic times, the records of which have been obliterated. From these remaining records, which probably form but a small fraction of the whole, the general facts deducible are:—That such organic types as have lived through successive epochs, have almost universally undergone modifications of

specific and generic values—modifications which have commonly been great in proportion as the period has been long. That besides the types that have persisted from ancient eras down to our own era, other types have from time to time made their appearance in the ascending series of our strata—types of which some are lower and some higher than the types previously recorded; but whence these types came, and whether any of them arose by divergence from the previously-recorded types, the evidence does not yet enable us to say. That in the course of long geologic epochs, nearly all species, most genera, and a few orders, become extinct; and that a species, genus, or order, which has once disappeared from the Earth, never reappears. And, lastly, that the Fauna now occupying each separate area of the Earth's surface, is very nearly allied to the Fauna which existed on that area during recent geologic times.

108. In the next chapter will be seen what interpretations may rationally be put on these and other general facts of distribution in Space and Time.

CHAPTER V.

THE EVOLUTION OF LIFE.

"Concerning the speculation commonly known as 'The Development Hypothesis'—its *a priori* and *a posteriori* evidences."

I. PRELIMINARY.

109. We have to choose between two hypotheses respecting the origin of living bodies. The one, of Special Creation, implying that organisms have been separately made. The other, of Evolution, implying that they have arisen by insensible steps, through actions such as we see habitually going on. Both hypotheses imply an inscrutable Cause. Let us inquire which of these is most congruous with established facts.

II. GENERAL ASPECTS OF THE SPECIAL-CREATION-HYPOTHESIS.

110. The hypothesis of special creations being a primitive one is probably untrue; for the interpretations of Nature given by aboriginal men being erroneous in other directions, they were most probably erroneous here, where the truth is comparatively hidden.

111. A further improbability is given to it by its association with a special class of mistaken beliefs which advancing knowledge has destroyed. There is everywhere fading away the anthropomorphic conception of the Unknown Cause. In one case after another, is abandoned that interpretation which ascribes phenomena to a will analogous to the human will, working by methods analogous to human methods.

112. This hypothesis is not only absolutely without evidence to give it external support—no one ever saw, or found indirect proof of, a special creation. But it cannot support itself internally: it cannot be framed into a coherent thought. It is one of those illegitimate symbolic conceptions, so continually mistaken for legitimate symbolic conceptions because they remain untested. (*First Principles*, § 9.)

113. This mere verbal hypothesis, which men idly accept as a real or thinkable hypothesis, is of the same nature as would be one, based on a day's observation of human life, that each man and woman was specially created, no changes of structure being apparent in so short a period. An hypothesis not suggested by evidence, but by lack of evidence. An hypothesis which formulates absolute ignorance into a semblance of positive knowledge.

114. The human body is the habitat of parasites, internal and external, animal and vegetal, numbering, if all were set down, some two or three dozen species; sundry of which are peculiar to man, and many of which produce in man great suffering and not unfrequently death. According to this hypothesis all these parasites were designed with a view to their respective modes of life. Shall we say that man was provided as a habitat for these parasites? Or shall we say that these degraded creatures, incapable of thought or enjoyment, were created that they might cause unhappiness to man? One or other of these alternatives must be chosen by those who contend that every kind of organism was separately devised by the Creator. Which do they prefer? Either is absolutely incompatible with the conception of a supreme beneficence.

115. Thus, however regarded, the hypothesis of special creations turns out to be worthless—worthless by its derivation; worthless in its intrinsic incoherence; worthless as being absolutely without evidence; worthless as not supplying an intellectual need; worthless as not satisfying a moral want. We must therefore consider it as counting

for nothing, in opposition to any other hypothesis respecting the origin of organic beings.

III. THE GENERAL ASPECTS OF THE EVOLUTION-HYPOTHESIS.

116. Conversely the Evolution hypothesis is favoured by its origin. It has arisen in comparatively instructed times, and in the most cultivated class.

117. Each further advance of knowledge confirms the belief in the unity of Nature; and the discovery that Evolution has gone on, or is going on, in religion, philosophy, science, and the arts, becomes a reason for believing that there is no department of Nature in which it does not go on.

118. The production of all organic forms by the slow accumulation of modifications upon modifications, and by the slow divergences resulting from the continual addition of differences to differences, is mentally representable in outline, if not in detail. It is a legitimate symbolic conception (*First Principles*, § 9). If a single cell, under appropriate conditions, becomes a man in the space of a few years; there can surely be no difficulty in understanding how, under appropriate conditions, a cell may, in the course of untold millions of years, give origin to the human race.

119. This definitely-conceivable hypothesis, besides the support of numerous analogies, has the support of direct evidence: we have positive proof that there is going on a process of the kind alleged; and though the results of this process, as actually witnessed, are minute in comparison with the totality of results ascribed to it, yet they bear to such totality, a ratio as great as that by which the hypothesis that the Earth's structure has arisen through the actions of natural causes, is justified.

120. Lastly, that sentiment which the doctrine of special creations is thought necessary to satisfy, is much better satisfied by the doctrine of evolution; since this doctrine raises no contradictory implications respecting the Unknown Cause, such as are raised by the antagonist doctrine. What-

ever may be thought of the evils accompanying Evolution, it is clear that they do not imply gratuitous malevolence.

121. The hypothesis of Evolution then, commends itself to us, by its derivation, by its coherence, by its analogies, by its direct evidence, by its implications. Let us go on to consider the several orders of facts which yield indirect support to it: noting first the harmonies that exist between it, and sundry of the "Inductions of Biology" (Chap. IV).

IV. THE ARGUMENTS FROM CLASSIFICATION.

122. In *Biology*, § 103, we saw that the relations which exist among the species, genera, orders, and classes of organisms, are not interpretable as results of any such causes as have been usually assigned. Are they interpretable as the results of Evolution?

123. That naturalists have been gradually compelled to arrange organisms in groups within groups; and that this is the arrangement which arises by descent, alike in individual families and among races of men, is a striking circumstance.

124. That while the smallest groups are the most nearly related, there exist between the great sub-kingdoms, structural contrasts of the profoundest kind; cannot but appear remarkable, when it is seen that where evolution is known to take place, it actually produces these feebly-distinguished small groups, and these strongly-distinguished great groups.

125. Again, as between the species, genera, orders, classes, &c., which naturalists have formed, there are transitional gradations; so between the groups, sub-groups, and sub-sub-groups, which are known to have been evolved, groups of intermediate values exist.

126. These three correspondences have further weight given to them by the circumstance, that the kinship of groups through their lowest members, is just the kinship which the hypothesis of evolution implies.

127. There is thus good reason to think with Darwin, "that propinquity of descent,—the only known cause of the similarity of organic beings,—is the bond, hidden as it is by various degrees of modification, which is partly revealed to us by our classifications" (*On The Origin of Species*, 1859, pp. 413-4).

V. THE ARGUMENTS FROM EMBRYOLOGY.

128. That subordination of classes, orders, genera, and species, to which naturalists have been led, is just that subordination which results from the divergence and re-divergence of embryos, as they all unfold, (*Biology*, § 52). On the hypothesis of Evolution, this parallelism indicates that primordial kinship of all organisms, and that progressive differentiation of them, which the hypothesis alleges.

129. The hypothesis of evolution, while it presupposes those general relations among embryos which are found to exist, also affords explanations of certain minor nonconformities to them. Remembering the perpetual intrusions of organisms on one another's modes of life, often widely different; and remembering that these intrusions have been going on from the beginning; we shall be prepared to find that the general law of embryologic parallelism, is qualified by irregularities that are mostly small, in many cases considerable, and occasionally great. The hypothesis of evolution accounts for these: it does more—it implies the necessity of them.

130. The substitutions and the suppressions of organs are among those secondary embryological phenomena which harmonize with the belief in evolution, but cannot be reconciled with any other belief. There are cases where, during its earlier stages of development, an embryo possesses organs that afterwards dwindle away, as there arise other organs to discharge the same functions. And there are cases where organs make their appearance, grow to

certain points, have no functions to discharge, and disappear by absorption.

131. Comparative embryology shows that besides substitutions of organs, there are what may be called substituted modes of development, broadly distinguishable as the *direct*, and the *indirect*. The familiar transformations of insects show how circuitous is the route by which the embryo form arrives at the adult form, among some divisions of the *Articulata*. Other divisions, as the lower *Arachnida*, display conversely how short is the route. How comes the direct mode of development in animals to have taken the place of the indirect, as, on the hypothesis of evolution, it must? We have seen reason to believe, that while the polarities of the physiological units determine the structure of the organism as a whole; the organism as a whole, if its structure is changed by incident forces, reacts on the physiological units, and modifies them towards conformity with its new structure. Now this action and reaction between an organic aggregate and its units, tending ever to bring the two into absolute harmony, must be continually making the developmental processes more direct; and leads us to expect, as the facts show, that where the conditions and structure have been most constant, the mode of development will be most direct; and that it will be the most indirect, where there have been the greatest and most numerous changes in the habits and structures of ancestral races of organisms. Between different parts in the same embryo, there are unlikenesses in the method of formation, which seem to have kindred meanings. The parts influencing the whole in degrees varying with their masses, there results a further influence which, from the outset, must begin to modify the metamorphoses of each kind of embryo; and cause it to show incipient divergences from embryos which had ancestral histories the same as its own.

132. So that while the embryologic law enunciated by von Baer, is in harmony with the hypothesis of evolution, and

is, indeed, a law which this hypothesis implies; the minor nonconformities to the law, are also interpretable by this hypothesis.

VI. THE ARGUMENTS FROM MORPHOLOGY.

133. The community of plan which exists among allied organisms when mature, is again extremely suggestive of evolution. It cannot be by chance that twenty segments characterize alike the dragon-fly, ladybird, butterfly, flea, crab, and lobster. The occasional deviation from this plan, as in the spiders and mites with less than twenty segments, while it negatives design, enforces the conclusion that organic forms have arisen from common stocks by perpetual divergences and re-divergences.

134. There are again the scarcely less significant homologies between different organs of the same organism: as in the sepals, petals, stamens, and pistils, in any individual flower, being all constructed on the same pattern. These likenesses disguised by unlikenesses, are worse than meaningless if it be supposed that organisms were severally framed as they now are; but they fit in quite harmoniously with the belief, that each kind of organism is a product of accumulated modifications upon modifications.

135. The presence in all kinds of animals and plants, of functionally-useless parts corresponding to parts that are functionally-useful in allied animals and plants, is another fact which the hypothesis of evolution leads us to expect. As Darwin says—"Nothing can be plainer than that wings are formed for flight, yet in how many insects do we see wings so reduced in size as to be utterly incapable of flight, and not rarely lying under wing-cases, firmly soldered together!" (*On the Origin of Species*, 1859, p. 451.)

136. The general truths of morphology thus coincide in their implications.

VII. THE ARGUMENTS FROM DISTRIBUTION.

137. Given the universal tendency of the superior to overrun the habitats of the inferior (*Biology*, § 105); What, on the hypothesis of evolution, will be the effects on the geographical relationships of species?

138. As races of organisms spread and are structurally altered by the varied incident forces, it follows that manifest kinships may be anticipated between organisms of adjoining areas, when no obstacle to migration occurs; that the widest divergences in Space will indicate the longest periods during which the descendants from a common stock have been subject to modifying conditions; and hence, that the smaller contrasts of structure will be limited to the smaller areas; and that where the incident forces vary greatly within given areas, the alterations will be more numerous than in equal areas which are less variously conditioned.

139. How the hypothesis of evolution corresponds with the facts of distribution through different media may next be considered. Water being the medium in which the lowest living forms exist, it is implied that the earth and the air have been colonized from the water. The great difficulties which apparently stand in the way of this assumption disappear on considering what the seashore displays. Twice a-day the rise and fall of the tide, covers and uncovers countless plants and animals, fixed and moving; and through the alternation of spring and neap tides, it results that the exposure of the organisms living low down on the beach, varies both in frequency and duration: while some of them are left dry only once a fortnight for a very short time, others a little higher up, are left dry during two or three hours at several ebb tides every fortnight. The *Mollusca* and *Articulata* supply examples of creatures having a wide excursiveness within this region. There are several crustaceans, as the crab, running about on the wet beach, and sometimes rambling beyond the reach of the water. And then note the striking fact, that each of these forms

thus habituated to changes of media, is allied to forms that are mainly or wholly terrestrial. The migrations from one medium to another, which evolution presupposes, are thus by no means impracticable.

140. The facts respecting distribution in Time, which have more than any others been cited both in proof and in disproof of evolution, are too fragmentary to be conclusive either way. Though the facts of palæontology cannot be held to prove evolution, yet they are in harmony with it; and some few of them yield it support.

141. Again, if the relations between past forms of life, and the forms now existing be contemplated, there is a connexion in perfect harmony with the belief in evolution. The last formed strata contain remains of those species which still flourish, while proportionately as the strata become older the living species present decrease in number and give way to extinct forms. There is also a peculiar connexion of like nature between present and past forms in each great geographical region.

142. That divergence and re-divergence of organic forms, which was shadowed forth by the truths of classification and embryology, is thus again emphasized by the truths of distribution.

VIII. HOW IS ORGANIC EVOLUTION CAUSED?

143. It will be instructive to glance at the causes of organic evolution that have been from time to time alleged.

144. Contrasted with the dogmas of his age, the idea of de Maillet (1735) was a great advance. Before it can be ascertained how organized beings have been gradually evolved, there must be reached the conviction that they *have* been gradually evolved; and this conviction he reached. His wild notions as to the way in which natural agencies acted in the production of plants and animals, must not make us forget the merit of his intuition that animals and plants *were* produced by natural causes.

145. In Dr. Erasmus Darwin's brief exposition, the belief in a progressive genesis of organisms, is joined with an interpretation having considerable definiteness and coherence. His reasonings show an unconscious mingling of the belief in a supernaturally impressed tendency to develop, with the belief in a development arising from the changing incidence of conditions.

146. Lamarck, asserting the same imaginary factors and the same real factors as Dr. Darwin, has traced out their supposed actions in detail; and has, in consequence, committed himself to a greater number of untenable positions. He nevertheless proved himself profounder than his contemporaries, by seeing that evolution, however it may have been caused, has been going on.

147. To say, with Dr. E. Darwin and Lamarck, that functional adaptation to conditions, produces either evolution in general, or the irregularities of evolution, is to raise the further question—why is there a functional adaptation to conditions?—why do use and disuse generate appropriate changes of structure? Only when the process of evolution of organisms, is affiliated to the process of evolution in general, can it be truly said to be explained. The thing required is to show that its various results are corollaries from first principles.

IX. EXTERNAL FACTORS.

148. The astronomical rhythms (*First Principles*, § 83) entail on organisms unceasing changes in the incidence of forces in two ways. They directly subject them to variations of solar influences, in such a manner that each generation is somewhat differently affected in its functions; and they indirectly bring about complicated alterations in the environing agencies, by carrying each species into the presence of new physical conditions.

149. As already shown (*First Principles*, § 158), it follows from the law of the multiplication of effects, that

during long periods, each tract of the Earth's surface increases in heterogeneity of both form and substance. Hence plants and animals of all kinds, are, in the course of generations, subject by these alterations in the crust of the Earth, to sets of incident forces which differ from previous sets, both by changes in the proportions of the factors, and, occasionally, by the addition of new factors.

150. Climatic variations that are geologically produced, being compounded with those which result from the slow astronomical changes; and no correspondence existing between the geologic and the astronomic rhythms; it results that the same plexus of actions never recurs. Hence the incident forces to which the organisms of every locality are exposed by atmospheric agencies, are ever passing into unparalleled combinations; and these are on the average always becoming more complex.

151. There are the still more involved changes in the incidence of forces which organisms exercise on one another (*Biology*, § 105). As the number of species with which each species is implicated, multiplies, each species is oftener subject to changes in the organic actions which influence it. These more frequent changes severally grow more involved. And the corresponding reactions affect larger Floras and Faunas, in ways increasingly complex and varied.

152. When these agencies are contemplated as becoming severally more complicated in themselves, and at the same time as co-operating in ways that are always more or less new; it will be seen that throughout all time, there has been an exposure of organisms to endless successions of modifying causes which gradually acquire an intricacy that is scarcely conceivable.

X. INTERNAL FACTORS.

153. In "*First Principles*," when considering the phenomena of Evolution in general, the leading characters and causes of those changes which constitute organic evolution,

were very briefly traced. It will be needful now to contemplate the several resulting processes as going on at once, in both individuals and species.

154. The law of the instability of the homogeneous (*First Principles*, §§ 149-55), has here a three-fold corollary. As interpreted in connexion with the ever-progressing, ever-complicating changes in external factors, it brings us to the conclusion that there must be a prevailing tendency towards greater heterogeneity in all kinds of organisms, considered both individually and in successive generations; as well as in each assemblage of organisms constituting a species; and, by consequence, in each genus, order, and class.

155. How the multiplication of effects conspires with the instability of the homogeneous, to work an increasing multiformity of structure in an organism, has been shown. (*First Principles*, § 159). Equally in the aggregate of individuals constituting a species, does multiplication of effects become the continual cause of increasing multiformity. The Flora and Fauna of every region are united by their entangled relations into a whole, of which no part can be affected without affecting the rest. Hence, each differentiation in a local assemblage of species, becomes the cause of further differentiations in it.

156. It has already been seen (*First Principles*, § 166), that in conformity to the universal law that mixed units are segregated by like incident forces, there are produced increasingly definite distinctions among varieties, wherever there occur definitely distinguished sets of conditions to which the varieties are respectively subject. The increasingly definite distinctions of structure in the individual organisms are similarly caused.

157. The apparent implication of the foregoing is, that organic evolution has been universal; that there has not been that persistence without progression which occasionally occurs. But since, by migration, it is possible for species to keep themselves under conditions that are tolerably

constant; it follows that there must be a proportion of cases in which greater heterogeneity of structure is not produced.

158. To show progression to result, not from a special, inherent tendency of living bodies, but from a general average effect of their relations to surrounding agencies, is not sufficient. It is quite conceivable that aggregates should be rendered more heterogeneous by changing incident forces, without having given to them that peculiar form of heterogeneity required for carrying on the functions of life. Hence it remains now to inquire, how the production and maintenance of this peculiar form of heterogeneity is insured.

XI. DIRECT EQUILIBRATION.

159. Any fresh force brought to bear on an aggregate in a state of moving equilibrium, must do one of two things: it must either overthrow the moving equilibrium altogether, or it must alter without overthrowing it; and the alteration must end in the establishment of a new moving equilibrium. Hence in organisms, death or restoration of the physiological balance, are the only alternatives. This equilibration may be direct or indirect. The new incident force may either immediately call forth some counteracting force, and its concomitant structural change; or it may be eventually balanced by some otherwise-produced change of function and structure. These two processes of equilibration are quite distinct, and must be separately dealt with. This division will be devoted to the first of them.

160. Direct equilibration is currently known as *adaptation* (*Biology*, §§ 67-71). Manifestly for any moving equilibrium to be gradually altered, it is needful, first, that some force shall operate upon it; and, second, that the force shall not be such as to overthrow it. What are the limits to direct equilibration hence arising?

161. In plants the "changes of habit," and the characters

of the leaves in respect of their sizes, thicknesses, and textures; are obviously in immediate relation to the characters of the environment. But such defensive appliances, as thorns and stinging-hairs, though they aid in maintaining the balance between inner and outer actions, cannot have been directly called forth by the outer actions which they serve to neutralize—the destruction of the plants by herbivorous animals; for these outer actions do not continuously affect the functions of the plant even in a general way, still less in the special way required.

162. Among animals, adaptation by direct equilibration, is shown by the darkening or lightening of the skin that follows exposure to greater or less heat. But such enamelled armour as is worn by the *Lepidosteus*, is inexplicable as a direct result of any functionally-worked change. For purposes of defence, such an armour is as needful, or more needful, for hosts of other fishes; and did it result from any direct reaction of the organism against any offensive actions it was subject to, there seems no reason why other fishes should not have developed similar protective coverings.

163. Hence there must be at work some other process. Besides direct equilibration, there must be an indirect equilibration.

XII. INDIRECT EQUILIBRATION.

164. From the fact that the individuals of a species are necessarily unlike (*Biology*, § § 85-91); it follows that some will be more in equilibrium with a change of conditions than others. Those most out of equilibrium will be those to die. Hence, by the continual destruction of the individuals that are the least capable of maintaining their equilibria in presence of a new incident force, an altered type must eventually be arrived at, completely in equilibrium with the altered conditions.

165. This survival of the fittest, which it has been sought

to express in mechanical terms, is that which Darwin has called "natural selection, or the preservation of favoured races in the struggle for life." This self-acting purification of a species must tend ever to insure adaptation between it and its environment. This adaptation may be either so *maintained* or so *produced*. That the average vigour of any race would be diminished, did the diseased and feeble habitually survive and propagate, is almost a self-evident truth. That "natural selection" is capable of *producing* fitness between organisms and their circumstances; and that it is an ever-acting cause of divergence among organic forms; Darwin was the first to perceive. Among animals the results are shown in the development of various structures which cannot have been affected by the performance of functions. The thick shell of a mollusc, is inexplicable as a result of direct reactions of the organism against the external actions to which it is exposed; but it is quite explicable as a result of the survival, generation after generation, of individuals whose thicker coverings protected them against enemies.

166. While Darwin has conclusively shown that the inheritance of changes of structure, caused by changes of function, is utterly insufficient to explain a great mass—probably the greater mass—of morphological phenomena; there is reason to think that he leaves unconsidered a mass of morphological phenomena that are explicable as results of functionally-acquired modifications, transmitted and increased, and which are not explicable as results of natural selection. Where the life is comparatively simple, or where surrounding circumstances render some one function supremely important, the survival of the fittest may readily bring about the appropriate structural change, without any aid from the transmission of functionally-acquired modifications. But as fast as the life grows complex, as fast as the number of bodily and mental faculties increases, and as fast as the maintenance of life comes to depend less on the amount of any one, and more on the combined action

of all; so fast does the production of specialities of character by natural selection alone, become difficult. It by no means follows, however, that here natural selection plays no part; for there must be a natural selection of functionally-acquired peculiarities, as well as of incidental peculiarities. There are, however, some modifications in the sizes and forms of parts, which must have resulted wholly from the inheritance of functionally-produced alterations. The dwindling away of organs of which the undue sizes entail no appreciable evils, furnishes the best evidence of this; as, for example, that diminution of the jaws and teeth which characterizes the civilized races, when contrasted with the savage races.

167. It remains to be shown that the process of natural selection conforms to the same general mechanical principles as do all other equilibrations. What must follow from the destruction of the least-resisting individuals and survival of the most-resisting individuals? On the moving equilibrium of the species as a whole, existing from generation to generation, the effect of this deviation from the mean state is to produce a compensating deviation. Had those which are destroyed lived and left offspring, the next generation would have had the same average balance of powers as preceding generations: there would have been a like proportion of individuals less endowed with this power, and individuals more endowed with this power. But the more-endowed individuals being alone left to continue the race, there must result a new generation characterized by a larger average endowment of this power. That is to say, on the moving equilibrium constituted by a species, an action producing change in a given direction, is followed, in the next generation, by a reaction producing an opposite change.

168. Indirect equilibration does whatever direct equilibration cannot do. It is scarcely possible too much to emphasize the conclusion, that all these processes by which organisms are re-fitted to their ever-chang-

ing environments, must be equilibrations of one kind or other.

XIII. THE CO-OPERATION OF THE FACTORS.

169. Thus the universal laws of the redistribution of matter and motion, to which things in general conform, are conformed to by all living things; whether considered in their individual histories, in their histories as species, or in their aggregate history. *The actions which we have specified in succession, are in reality simultaneous; and they must be so conceived before organic evolution can be rightly understood.* Some aid towards so conceiving them, will be given by the annexed table (p. 124), representing the co-operation of the factors.

170. There seems reason to think that as fast as essential faculties multiply, and as fast as the number of organs that co-operate in any given function increases, indirect equilibration through natural selection, becomes less and less capable of producing specific adaptations; and remains fully capable only of maintaining the general fitness of constitution to conditions. Simultaneously, the production of adaptations by direct equilibration, takes the first place—indirect equilibration serving to facilitate it.

XIV. THE CONVERGENCE OF THE EVIDENCES.

171. On considering the "General Aspects of the Special Creation Hypothesis," it was discovered to be worthless. Contrariwise, the "General Aspects of the Evolution Hypothesis," begot the stronger faith in it the more closely they were examined. Thus there could be no rational hesitation which of the two views should be entertained.

172. Further means of judging there has been since, in the inductive evidences dealt with in the divisions upon Classification, Embryology, Morphology, and Distribution. In each of these four groups were several arguments which

- Astronomic changes
- Geologic changes
- Meteorologic changes

} alter the incidence of inorganic forces.

- Enemies
- Competitors
- Co-operators
- Prey

} varying in number

- Enemies
- Competitors
- Co-operators
- Prey

} varying in kind

} alter the incidence of organic forces.

} on each species: affecting

its individuals,

- immediately through their functions;
  - which, partially in the first generation, and completely in the course of generations, are directly equilibrated with the changed agencies.
  - which have their direct equilibration with the changed agencies, aided by indirect equilibration, through the more frequent survival of those in which the direct equilibration is most rapid.
- mediately through the aggregate of individuals;
  - positively—by aiding the multiplication of those whose moving equilibria happen to be most congruous with the changed agencies: thus, in the course of generations, indirectly equilibrating certain individuals with them.
  - negatively—by killing those whose moving equilibria are most incongruous with the changed agencies: thus, in the course of generations, indirectly equilibrating each of its surviving individuals with them.

its aggregate of individuals,

- by acting on it in some parts of the habitat more than in others; and thus differentiating the species into local varieties.
- by acting differently on slightly-unlike individuals in the same locality;
  - and thus causing differentiations of the species into varieties, irrespective of locality.
  - and thus causing modification of the species as a whole, by abstracting a certain class of its units

point to the same conclusion; and the conclusion pointed to by the arguments of any one group, is that pointed to by the arguments of all the other groups. This coincidence of coincidences, would give to the induction a very high degree of probability, even were it not enforced by deduction.

173. But the conclusion deductively reached, is in harmony with the inductive conclusion. Passing from the evidence that evolution has taken place, to the question—How has it taken place? We find in known agencies and known processes, adequate causes of its phenomena. Organic evolution conforms to those universal laws of the redistribution of matter and motion, which are conformed to by evolution in general.

174. We are now about to pass to the more special phenomena of development, as displayed in the structures and functions of individual organisms. If the hypothesis that plants and animals have been progressively evolved, be true, it must furnish us with keys to these phenomena. It does this; and by doing so, gives numberless additional vouchers for its truth.

CHAPTER VI.

MORPHOLOGICAL DEVELOPMENT.

"Pointing out the relations that are everywhere traceable between organic forms and the average of the various forces to which they are subject; and seeking in the cumulative effects of such forces a theory of the forms."

I. THE PROBLEMS OF MORPHOLOGY.

175. In Nature, structures and functions are inseparable co-operators. Hence, when treating apart Morphological Development and Physiological Development, all that can be done is to direct our attention mainly to the one or to the other, as the case may be.

176. The problems of Morphology fall into two distinct classes as they treat of increase of mass, or increase of structure. The former being primary; the latter, following it with more or less regularity, being secondary. In organisms increase of mass may be due to growth in units of the first order—simple units; or in those of the second order—aggregated groups of units; or in those of the third—groups of groups of units—and still higher orders; or, as is more usual, it may be due to simultaneous growth in units of several orders.

177. The morphological problems of the second class, are those having for their subject-matter the changes of shape that accompany changes of aggregation. The contrasts caused by variations in the process of differentiation have to be considered. To speak specifically—the shape of the organism as a whole, irrespective of its composition, has to be accounted for.

178. The process of evolution has to be traced throughout these phenomena. Two sets of factors must be taken into account. The factors of the first class are those which tend directly to change an organic aggregate from that more simple form which is not in equilibrium with incident forces, to that more complex form which is in equilibrium with them. The factors of the second class, are the formative tendencies of organisms themselves—the proclivities inherited by them from antecedent organisms, and which past processes of evolution have bequeathed.

179. Let us now deal with the primary class of morphological problems; first establishing each general truth empirically, and then proceeding to the rationale of it.

II. THE MORPHOLOGICAL COMPOSITION OF PLANTS.

180. The hypothesis of evolution prepares us for two radical modifications of the doctrine that all organisms are built up of cells, or that cells are the elements out of which every tissue is developed. It leads us to expect that as structureless portions of protoplasm must have preceded cells in the process of general evolution; so, in the special evolution of each higher organism, there will be an habitual production of cells out of structureless blastema. And, though generally, the physiological units composing a structureless blastema will display their inherited proclivities by cell-development and metamorphosis; there will nevertheless occur cases in which the tissue to be formed, is formed by direct transformation of the blastema. While the cell may properly be regarded as the morphological unit, it must constantly be borne in mind that it is so only in a greatly-qualified sense.

181. The various species of *Desmidiaceæ*, and *Diatomaceæ*, supply examples of morphological units living and propagating separately, under numerous modifications of form and structure. Considerable bulk may be attained by the continuous growth of an aggregate of the first order.

182. The transition to higher forms begins in a very unobtrusive manner. While in the lower types, the primitive spheroidal forms of the cells are scarcely altered; in the higher types, the cells may be so fused together as to constitute cylinders divided by septa. Here, however, the indefiniteness is still great: there are no specific limits to the length of any thread thus produced; and none of that differentiation of parts required to give a decided individuality to the whole. To constitute something like a true aggregate of the second order, capable of serving as a compound unit, that may be combined with others like itself into still higher aggregates, there must exist both mass and definiteness.

183. Where, as in the common *Fuci* of our coasts and the higher lichens, the morphological units show an inherent tendency to arrange themselves in a manner that is so far constant as to give characteristic proportions, there may be said to be a recognizable compound individuality.

184. Another mode in which aggregation is so carried on as to produce a compound individuality of considerable definiteness, is variously displayed among other families of *Algæ*. When the cells, instead of multiplying longitudinally alone, and instead of all multiplying laterally as well as longitudinally, multiply laterally only at particular places; they produce a branched structure.

185. Certain of the highest *Algæ* display aggregates of the third order. The fronds of *Delesseria sanguinea*, quite regularly shaped, have their parts decidedly subordinated to the whole; and from their mid-ribs grow other fronds, which are just like them. Each of these fronds is an organized group of those morphological units which we distinguish as aggregates of the first order. And in this case, two or more such aggregates of the second order, well individuated by their forms and structures, are united together; and the plant composed of them is thus rendered, in so far, an aggregate of the third order.

186. Let us now pass to the higher plants, which, instead

of being buoyed up by the surrounding medium have to erect themselves into such a rare fluid as the air, and have two sources of nutriment—roots and exposed leaves—in place of one. The *Jungermanniaceæ* clearly indicate the transition from a secondary to a tertiary aggregate. The lowest members of the group showing but an incomplete development of the second order — the irregular frond, indefinite in size and outline, spreading hither or thither as the conditions favour; and putting out rootlets indifferently from all parts of its under-surface; while the most developed members of the group, display tertiary aggregates that are physiologically as well as physically integrated; growing erect, the stem and attached leaflets become dependent upon a single root or group of roots—there arises a definitely established aggregate of the third degree of composition.

III. THE MORPHOLOGICAL COMPOSITION OF PLANTS—*continued.*

187. In the *Phanerogamia*, aggregation of the third order is always distinctly displayed; and aggregates of the fourth, fifth, and sixth, &c., orders are very common.

188. On studying the development of simple into compound leaves, the truths shadowed forth, reduced to their most general expression, are these:—That group of morphological units, or cells, which is integrated into the compound unit called a leaf, has, in each higher plant, a typical form; due to the special arrangement of these cells around a mid-rib and veins. If the multiplication of morphological units, at the time when the leaf-bud is taking on its main outlines, exceeds a certain limit, these units begin to arrange themselves round secondary centres, or lines of growth, in such ways as to repeat, in part or wholly, the typical form: the larger veins become transformed into imperfect mid-ribs of partially independent leaves; or into complete mid-ribs of quite separate leaves. And as there goes on this transition from a single aggregate

of cells to a group of such aggregates, there simultaneously arises, by similarly insensible steps, a distinct structure which supports the several aggregates thus produced, and unites them into a compound aggregate.

189. The fundamental kinship existing among all the foliar organs of a flowering-plant, is shown by the transitional forms which may be traced between them, and by the occasional assumption of one another's forms. There is clear evidence that in Phanerogams, all the appendages of the axis—whether bracts, sepals, petals, stamens, styles, or ovules—are homologues. They are all modified leaves. To modifications in the developments of foliar organs, have to be added modifications in the developments of axial organs. Comparisons disclose the gradations through which axes, like their appendages, pass into all varieties of size, proportion, and structure.

190-91. Seeing how, in an individual plant, the single leaves pass into compound leaves, by the development of their veins into mid-ribs, while their mid-ribs begin to simulate axes; and seeing that leaves ordinarily exhibiting definitely-limited developments, occasionally produce other leaves from their edges; and on discovering how frequent are the monstrosities that do not seem satisfactorily explicable without admitting the development of foliar organs into axial organs; we become ready to entertain the hypothesis, that during the evolution of the phanerogamic type, the distinction between leaves and axes has arisen by degrees. With our preconceptions loosened by such facts, and bearing in mind the general idea which they suggest, the typical structure of a flowering plant may now be interpreted.

192. To proceed methodically, a clue to the structures of Endogens and Exogens must be sought in the structures of those inferior plants that approach to them—Acrogens. That an axis may lift its attached leaves into the air, implies thickness and solidity proportionate to the mass of such leaves; and an increase of its sap-vessels, also pro-

portionate to the mass of such leaves, is necessitated when the roots are all at one end and the leaves at the other. But in the generality of Acrogens, these conditions, under which arises the necessity for transverse growth of the axis, are absent, wholly or in great part. For the stem habitually creeps below the surface, or lies prone upon the surface; and where it grows in a vertical or inclined direction, does this by attaching itself to a vertical or inclined object. Moreover, throwing out rootlets, as it mostly does, at intervals throughout its length, it is not called upon in any considerable degree, to transfer nutritive materials from one of its ends to the other. Hence this peculiarity—longitudinal and not transverse increase—which gives their name to the Acrogens, is a natural concomitant of the low degree of specialization reached in them. Concluding, then, as we are fully justified in doing, that the lateral expansion accompanying longitudinal extension, which is a general characteristic of Endogens and Exogens as distinguished from Acrogens, is nothing more than a concomitant of their usually vertical growth; let us now go on to consider how vertical growth originates, and what are the structural changes it involves.

193. Plants depend for their prosperity mainly on air and light: they dwindle where they are smothered, and thrive most where they can expand their leaves into free space and sunshine. The stiffness for maintaining the upward growth may be acquired in two essentially-different ways. That natural selection will favour those fronds of recumbent Acrogens that curve round upon themselves, and especially those whose edges meet and unite, may be gathered from the fact that a thin layer of substance gains greatly in strength when bent so as to form a tube. If, while frond continues to grow out of frond, the series of united mid-ribs continues to be a channel of circulation, there will result a solid axis wrapped round by an outer foliar layer. But if, on the other hand, the vascular bundles become distributed all round the tube a hollow cylinder will result. The former structure corresponds with a *Dendrobium*, the latter with a grass.

The only other way in which the requisite stiffness appears producible, is by the thickening and hardening of the fused series of mid-ribs. The successive mid-ribs that enter into the continuous bond will become more bulky than their disengaged portions, and there will be a greater development of that connecting portion of the successive fronds, by which they are kept in communication with the roots, and are raised above the ground. Among plants of bushy growth, in which the assimilating surfaces become liable to intercept one another's light, natural selection will continue to give an advantage to those which carry their assimilating surfaces at the ends of the petioles. Whence will result a disappearance of the stipules and the foliar fringes of the mid-ribs; ending in the production of the ordinary stalked leaf. Meanwhile, the axis thickens in proportion to the number of the leaves and the nutritive matter it has to carry: and so becomes contrasted with the petioles.

194. What is the origin of axillary buds? They are interpretable in the same manner as the terminal buds. In certain plants not only does the primary frond bud out secondary fronds from its mid-rib; but most of the secondary fronds similarly bud out several tertiary fronds; and even by some of the tertiary fronds, this prolification is repeated. If, now, this habit grows organic—if it becomes, as it naturally will become, the characteristic of a plant of luxuriant growth, the unfolding parts of which can be fed by the unfolded parts; it will happen with each lateral series, as with the main series, that its successive components will begin to show themselves at earlier and earlier stages of development. And in the same way that, by dwarfing and generalizing the original series, a structure like the terminal bud is arrived at; by dwarfing and generalizing a lateral series, a structure answering in nature and position to the axillary bud is arrived at.

195. Why does the monoctyledonous mode of germination everywhere coexist with the endogenous mode of growth; and the di- or poly-cotyledonous with the exogenous mode

of growth? If the strength required for maintaining the vertical attitude is obtained by the endogenous mode of infolding, the primary frond will more and more conceal the secondary, and limit its supply of light and air. Hence, there must always continue such pre-eminence of the first formed frond or its representative, as to make the germination monocotyledonous. Contrariwise, where the strength is obtained from the continuous mid-rib, the second frond becomes the more favourably circumstanced and rapidly gains an equality with the first. The two eventually being produced simultaneously, the germination will consequently become dicotyledonous.

196. The unit of composition of a Phanerogam, is such portion of a shoot as answers to one of the primordial fronds. And consists of a foliar appendage together with the preceding internode, including the axillary bud where this is developed. The foliar organ is the most constant element; the internode and the axillary bud, are successively less constant. On approaching the flower, the axillary bud disappears. In the flower itself, there remains only a foliar surface; which in the quite terminal organs of fructification, is reduced to a mere rudiment.

197. The foregoing synthesis explains various irregularities. When we see leaves sometimes producing leaflets from their edges, we recognize in the anomaly, a resumption of an original mode of growth. The occasional production of bulbils by Phanerogams, ceases to be so surprising when it is found to be habitual among the inferior Acrogens, and that it is but a repetition, on a higher stage, of that self-detachment which is common among proliferously-produced fronds. Nor are we any longer without a solution of that transformation of foliar organs into axial organs, which not uncommonly takes place.

198. Though occasionally among Phanerogams, the germs of new axes develop separately; yet in most cases they maintain connexion with the parent axis; whence results a group of axes—an aggregate of the fourth order. Every

tree, by the production of branch out of branch, shows this integration repeated over and over again: forming an aggregate having a degree of composition too complex to be any longer defined.

IV. THE MORPHOLOGICAL COMPOSITION OF ANIMALS.

199. Our survey must here commence with those undifferentiated aggregates of physiological units, out of which are formed what we call, with considerable license, morphological units.

200. In the animal kingdom, as in the vegetal, there exists a class of minute forms, as the Rhizopods, having this peculiarity, that no one of them is separable into a number of visible components homologous with one another—no one of them can be resolved into minor individualities. Its proximate units are those physiological units of which we conclude every organism consists. The aggregate is an aggregate of the first order.

201. Among plants are found types indicating a transition from aggregates of the first order to aggregates of the second order; and among animals are found analogous types. But the stages of progressing integration are not here so distinct. The reason probably is, that the simplest animals, having individualities much less marked than those of the simplest plants, do not afford us the same facilities for observation. In proportion as the limits of the minor individualities are indefinite, the formation of major individualities out of them, naturally leaves less conspicuous traces. The class *Cœlenterata* first displays an aggregate of the second order, so individuated as to be capable of serving as a unit in still higher combinations. The common *Hydra* exhibits a total life distinct from the lives of the units.

202. The compound *Cœlenterata* are aggregates of the third order, produced by integration of aggregates of the second order such as we have in the *Hydra*. On the

hypothesis of evolution, these higher integrations will insensibly arise, as we find them, if the separation of the gemmiparous polypes is longer and longer postponed; and increasing postponement will result by survival of the fittest, if it profits the group of individuals to remain united instead of dispersing.

203. The like relations exist, and imply that the like processes have been gone through, among those more highly-organized animals called *Molluscoida*. There are solitary individuals, and there are variously-integrated groups of individuals: the chief difference here, being the absence of a type obviously linking the solitary state with the aggregated state.

204. Does there exist in other sub-kingdoms composition of the third degree, analogous to that which is so prevalent among the *Cœlenterata* and the *Molluscoida*? The question is not whether elsewhere there are tertiary aggregates produced by the branching or clustering of secondary aggregates; but whether elsewhere there are aggregates which, though otherwise unlike in the arrangement of their parts, nevertheless consist of parts so similar to one another that they may be suspected to be united secondary aggregates? Very little search suffices; for structures of the kind to be expected are abundant. In that great division of the animal kingdom called *Annulosa*, including the *Annuloida*, are a variety of types having the looked-for characters.

205. Every segment in an adult Annelid is in a great measure a physiological whole—every segment contains most of the organs essential to individual life and multiplication: such essential organs as it does not contain, being those which its position as one in the midst of a chain, prevents it from having or needing. The reasons for believing one of these animals to be an aggregate of the third order, are greatly strengthened when we turn from the adult structure to the mode of development.

206. Comparison of annulose animals in general discloses various phases of progressive integration of the kind to be

anticipated. We see that longitudinal gemmation does go on; that it is displayed in that primitive form in which the gemmæ separate as soon as produced; that there are types in which such gemmæ hang together in groups of four, or in groups of eight and ten, from which however the gemmæ successively separate as individuals; that among higher types there are long strings of similarly-formed gemmæ which do not become individually independent, but separate into organized groups; and that from these we advance to forms in which all the gemmæ remain parts of a single individual.

207. Thus far only the less-developed *Annulosa* have been considered. If in the more integrated and more differentiated types, we find a carrying further of the processes by which the lower types are here supposed to have been evolved, there will be additional reason for believing them to have been so evolved.

V. THE MORPHOLOGICAL COMPOSITION OF ANIMALS—*continued.*

208. In the higher *Annulosa*, containing the Insects, Arachnids, Crustaceans, and Myriapods, the much greater consolidation and much greater heterogeneity do not obliterate evidence of the fact, that the organism is an aggregate of the third order. Beyond all question it is divisible into a number of proximate units, "segments," "metameres," or "somites," each of which has essentially the same structure as its neighbours, and each of which is an aggregate of the second order, in so far as it is an organized combination of those aggregates of the first order which we call morphological units or cells. And that these segments or somites, were originally aggregates of the second order having independent individualities, is an hypothesis which gathers support from the contrast between the higher and the lower articulate types, as well as from the contrast between the *Articulata* in general and the inferior *Annulosa*.

209. In the *Mollusca*, commencing another great group,

where for the first time there is homogenesis holding throughout an entire sub-kingdom, there is no case in which the organism is divisible into like parts. A Mollusc is an aggregate of the second order. Neither in the adult animal, nor in the embryo, is there any sign of a multiplicity of like parts that have become obscured by integration. In certain Molluscs the segmented structure is simulated, but only simulated.

210. Among the *Vertebrata*, as among the *Mollusca*, homogenesis is universal. In both sub-kingdoms the normal process is the integration of the whole germ-mass into a single organism, which at no phase of its development displays any tendency to separate into two or more parts. Equally as throughout the *Mollusca* there holds throughout the *Vertebrata*, the correlative fact, that not even in its lowest any more than its highest types, is the body divisible into homologous segments. The vertebrate animal cannot be cut into transverse slices, each of which contains a digestive, a respiratory, and a reproductive organ, &c. The segmental composition which characterizes the apparatus of external relation in most *Vertebrata*, is not primordial or genetic, but functionally determined or adaptive. The vertebrate animal is an aggregate of the second order, in which a relatively superficial segmentation has been produced by mechanical intercourse with the environment. It will hereafter be seen that this conception leads to a consistent interpretation of the facts—shows why there has arisen such unity in variety as exists in every vertebral column, and why this unity in variety is displayed under countless modifications in different skeletons.

211. Thus, starting with minute aggregates of those physiological units which compose protoplasm; we pass by union of these to aggregates of the second order, as the Sponges, &c.; and by union of these again to tertiary aggregates, as the *Hydrozoa*. The *Mollusca* and *Vertebrata* are only aggregates of the second order, that have in many cases become very large and complex.

VI. MORPHOLOGICAL DIFFERENTIATION IN PLANTS.

212. During their evolution, plants and animals have also progressively differentiated, both as wholes and in their parts.

213. Can the shape of a plant be expressed in universal terms? Can the shapes and sizes of its branches, its leaves, its fronds, and the units of which they consist, conform to any law? These are now our questions.

214. In studying morphological differentiation, we must bear in mind that the forces to be overcome, the forces to be utilized, and the matters to be appropriated, do not remain the same in their proportions and modes of action for any two members of the aggregate: be they members of the first, second, third, or any other order.

215. Every member of an aggregate is also differentiated by presenting itself in some peculiar way towards the light, the air, and its point of support.

216. Let us now specify the meanings of certain descriptive terms we shall have to employ. The entirely irregular forms will be classed as *asymmetrical*. The forms which approximate towards regularity without reaching it, will be distinguished as *unsymmetrical*. The most regular of figures is the sphere, displaying *spherical symmetry*. When a sphere passes into a spheroid, there is *radial symmetry*, as in the tulip. Then there is *bilateral symmetry*, which may be *triple*, as in the common brick; *double*, as in a boat made alike at stem and stern; and *single*, as in the common boat. In tracing up organic evolution as displayed in morphological differentiations, we shall pass from spherical to single bilateral symmetry: from the less to the more heterogeneous.

VII. THE GENERAL SHAPES OF PLANTS.

217. Among protophytes the simplest are the globular *Protococci*, in which uniformity of figure coexists with the

uniform exposure of all their sides to incident forces. In the *Desmidiaceæ* and *Diatomaceæ* there is triple bilateral symmetry, coexisting with a triple bilateral symmetry in the average distribution of actions. When the two ends are permanently subject to different conditions, as in fixed unicellular plants where one part is applied to the supporting surface and the other extends into the surrounding medium, we find that the parts which are most unlike in their relations to incident forces, are the most unlike in their forms. Where there is total irregularity in the incidence of forces the shape is asymmetrical.

218. Illustrations of the general truths which the forms of these vegetal aggregates of the first order display, are again furnished by vegetal aggregates of the second order. The equalities and inequalities of growth in different directions, prove to be similarly related to the equalities and inequalities of environing actions in different directions. A puff-ball shows this in the simplest way. If we cut vertically through its centre, there is a difference between top and bottom, if we cut horizontally through its centre, there is no difference among its sides. Being, on the average of cases, similarly related to the environment all round, it remains the same all round.

219. Leaving out of consideration the difference between the supporting part and the supported part in Phanerogams, and looking at the supported part only, there is between its form and the habitual incidence of forces, a relation like that displayed by the simpler plants. Trees and shrubs when standing alone, and in positions where the winds do not injure them or adjacent objects shade them, develop with tolerable evenness on all sides. Conversely, when trees grow at the edge of a wood, the outer branches are well-developed and the inner comparatively ill-developed; they diverge from an indefinitely radial to an indefinitely bilateral symmetry.

220. The object of the four following divisions will be to show, that this relation between forms and forces holds

alike in the organism as a whole, in its proximate units, and in its units of lower orders. Let us begin with the largest parts into which plants are divisible; and proceed to the successively smaller parts.

VIII. THE SHAPES OF BRANCHES.

221. Aggregates of the first order supply a few examples of forms ramified in an approximately-regular manner, under conditions which subject their parts to approximately-regular distributions of forces.

222. Among aggregates of the second order, each proximate component is modified by its relations to the rest.

223. Passing to plants of the third degree of aggregation, the same thing is true of the parts in their relations to the whole and to one another, which is true of the whole in its relations to the environment at large. Entire trees become bilateral instead of radial, when exposed to forces that are equal only on opposite sides of one plane; and in their branches, parallel changes of form occur under parallel changes of conditions.

224. How a branch carries its leaves constitutes one of its characters as a branch; and is to be considered apart from the characters of the leaves themselves. The foregoing principles are here still further illustrated. The leading shoot of a fir-tree has its leaves placed radially, while the lower the branch the more bilateral does their distribution become. The sizes of the leaves on the same branch also vary in proportion to the supply of light.

225. The asymmetry, or heterogeneity of form, assumed by the twigs and leaves on a branch, is caused by the asymmetrical distribution of incident forces.

226. The proximal or attached ends of branches differ from their distal or free ends, in the same way that the lower ends of trees differ from their upper ends. Once again, the most differently-conditioned parts become the most strongly contrasted in their structures.

227. Thus, growths are unequal in proportion as the relations to the environment are unequal.

IX. THE SHAPES OF LEAVES.

228. The relative sizes and distributions of the leaflets of compound leaves have now to be considered. Radial symmetry is completely displayed where the leaflets either do not interfere with one another at all, or do so only occasionally. How far differences of development in compound leaves that are completely bilateral are due to the position of the parts in the bud; how far the respective spaces available for the parts when unfolded affect them; and how far the parts are rendered unlike by unlikenesses in their relations to light; it is difficult to say. Probably these several factors operate in all varieties of proportion.

229. That the bilateral form of leaf is the ordinary form, corresponds with the fact that, ordinarily, the circumstances of the leaf are different in the direction of the plant's axis from what they are in the opposite direction, while transversely the circumstances are alike. The leaves of most trees and plants will be remembered by all as having the ends by which they are attached unlike the free ends, while the two sides are alike. And it will also be remembered that these equalities and inequalities of development correspond with the equalities and inequalities in the incidence of forces.

230. A confirmation that is interesting and important, is furnished by the cases in which leaves present unsymmetrical forms in positions where their parts are unsymmetrically related to the environment. Where the half on one side the mid-rib is more shaded than the other half, bilateral symmetry is considerably modified.

231. Here, as before, homologous units of any order become differentiated in proportion as their relations to incident forces become different.

X. THE SHAPES OF FLOWERS.

232. The members of clusters of flowers are distributed in an all-sided manner or in a two-sided manner, according as the circumstances are alike on all sides or alike only on two sides.

233. The radially-symmetrical form is common to all individual flowers that have vertical axes. At first it seems that flowers thus placed should alone be radial; but remembering that the radial form is the primitive form, a permanent modification of it can be expected only in cases where, by inheritance, the effect of the modifying causes accumulates. Where flowers are placed in countless different attitudes—as in the Apple and Hawthorn—there is no uniformity in the relations of their parts to surrounding influences, and the radial form must continue.

234. Transitions varying in degree from the radial towards the bilateral, are common in flowers that are borne at the ends of branches or axes which are inclined in tolerably constant ways. From these, we pass insensibly to forms having bilateral symmetry strongly pronounced. This leads us to the cases in which radial symmetry continues to coexist with that constant lateral attitude ordinarily accompanied by the two-sided form, as in the Hollyhock-flower. Why does the radial form here remain unchanged? and how does its continuance consist with the alleged general law? The answer lies in the fact that the forms of flowers are influenced by actions that do not influence the forms of leaves. Flowers are the parts in which fertilization is effected; and the agents of this fertilization are insects—bees, moths, &c. Flowers which are distributed over a plant in such ways that their discs open out on planes of all directions and inclinations, will have no tendency to lose their radial symmetry; since no part of the periphery is differently related to insect agency from any other part.

235. The modifications undergone by the component flowers of clusters, are shown by the facts to be noted

in the umbel of the clustered flower *Heracleum*—the cow-parsnip. The external umbellules are larger than the internal ones; in each umbellule the central flowers are less developed than the peripheral ones; this greater development of the peripheral flowers is most marked in the outer umbellules; and on the outer sides of the outer umbellules; while the interior flowers of each umbellule are radial, the exterior ones are bilateral; which bilateralness is most marked in the peripheral flowers of the peripheral umbellules; and that where the outer umbellules touch each other, the flowers become unsymmetrically bilateral. The conclusion is, therefore, that the differences in the conditions are the causes of the differences in the forms.

236. Flowers thus re-illustrate the general laws of form which leaves and branches and entire plants disclose.

XI. THE SHAPES OF VEGETAL CELLS.

237. Already something has been said (*Biology*, § 217.) concerning the forms of those morphological units which exist as independent plants. When they become components of larger plants, their divergencies from primordial sphericity are such as correspond with the unlikenesses in the circumstances of their respective sides. From the most complex vegetal types down to the most simple, the laws of morphological differentiation remain the same.

XII. CHANGES OF SHAPE OTHERWISE CAUSED.

238. Certain consequences of variations in the total quantities of the matters and forces furnished to plants by their environments, must be briefly noticed.

239. That changes of form correspond with changes of nutrition, is shown by the long internodes of luxuriant shoots, and by the clustered nodes of those lacking sap. The development or non-development of lateral axes is often similarly determined.

240. The morphological characters which distinguish gamogenetic axes in general from agamogenetic axes, such as non-development of the internodes, and dwarfing of the foliar organs, are primarily results of failure in the supply of some material required for further growth.

241. The helical arrangement of parts in Phanerogams inevitably follows from the rates of growth on all sides of a shoot never being exactly alike (*First Principles*, §§ 149-155). A deviation likely to be increased by natural selection, for a plant will profit by having its axis so twisted that the appended leaves may not shade one another.

XIII. MORPHOLOGICAL DIFFERENTIATION IN ANIMALS.

242. The processes of morphological differentiation in the animal kingdom conform to the same general laws as in the vegetal kingdom. There is however one new and all-important factor to take into account.

243. This new factor is motion—motion of the organism in relation to surrounding objects, or of the parts of the organism in relation to one another, or both. According to the kind of intercourse between the organism and its environment, results either a single or double bilateral symmetry; a radial symmetry; a spherical symmetry; or total irregularity. These *a priori* conclusions may be confirmed.

XIV. THE GENERAL SHAPES OF ANIMALS.

244. The more or less irregular shape of the *Infusoria* is manifestly in congruity with the incidence of forces. Their movements being conspicuously varied and indeterminate—movements which do not expose any two or more sides of the mass to approximately equal sets of actions.

245. Among aggregates of the second order, as among aggregates of the first order, we find that of those possessing any definite shapes the lowest are spherical or spheroidal.

246. Radial symmetry is usual in those aggregates of the

second order that have their parts sufficiently differentiated and integrated to give individualities to them as wholes, as in the *Cœlenterata*. In a common *Medusa*, advancing through the water by the rhythmical contractions of its disc, the mechanical reactions are the same on all sides; and as, from the varied causes, every part of the edge of the disc comes upwards in its turn, no part is permanently affected in a different way from the rest. Hence the radial form continues.

247. Keeping to the same type but passing to a higher range of composition, more complex and varied illustrations of the same general laws are met with. In such compound *Cœlenterata* as the tree-like coral polypedoms, the attached ends not only differ from the free ends as they do in plants; but the regular or irregular branches obviously stand to environing actions in relations analogous to those in which the branches of plants stand.

248. The relations of forms to forces in the *Molluscoida*, where there are simple individuals or aggregates of the second order, and societies or tertiary aggregates produced by their union, is not obviously at variance with the laws alleged.

249. Good examples of the connexions between forms and forces occur in the *Annuloida*, where we begin again with simple aggregates of the second order, and ascend to aggregates in which there is reason to suspect a higher degree of composition. The *Echinodermata* here furnish instructive illustrations—instructive because among types that are nearly allied, wide deviations of form are met with answering to marked contrasts in the relations to the environment.

250. Very definite and comparatively uniform, are the relations between shapes and circumstances among the *Annulosa*, including under that title the *Annelida* and the *Articulata*. The agreements and the disagreements are equally instructive. That Flies, Beetles, Lobsters, Centipedes, Spiders, Mites, have in common the characters, that

the end which moves in advance differs from the hinder end, that the upper surface differs from the under surface, and that the two sides are alike, is a truth which, received as a matter of course, supplies a million-fold illustration of the laws set forth. That annulose animals become unsymmetrical where their parts are unsymmetrically related to the environment may be seen in the unlikeness of the sides of the adult Hermit-crab.

251. Among the *Mollusca* there are more varied relations between shapes and circumstances. The *Lamellibranchiata* display diverse forms accompanying diverse modes of life. In the fresh-water Mussel which frequently moves about, the valves are bilaterally symmetrical. In the Oyster where one valve is always downwards, or next to the surface of attachment, while the other is always upwards, or next to the environing water, the two valves become unlike.

252. The *Vertebrata* illustrate afresh the truths which we have already traced among the *Annulosa*. Flying through the air, swimming through the water, and running over the earth as vertebrate animals do, they are, in common with annulose animals, different at their anterior and posterior ends, different at their dorsal and ventral surfaces, but alike along their two sides. This single bilateral symmetry remains constant under the most extreme modifications of form. A less obvious fact which it concerns us here to note is, that whereas the lower vertebrate forms deviate but little from triple bilateral symmetry, the deviation becomes great on ascending to the higher forms.

253. Thus the one ultimate principle, that in any organism equal amounts of growth take place in those directions in which the incident forces are equal, serves as a key to the phenomena of morphological differentiation. Without occupying space on the differentiations of homologous segments, and on the internal structures of animals; let us pass on to those structures, which, though internal, are brought into tolerably direct relations with the environing forces, and are therefore subordinate in their forms to the distribution of those forces.

XV. THE SHAPES OF VERTEBRATE SKELETONS.

254. If a bar of wood, supported at its two ends, has to bear a weight on its centre, its lower part is thrown into a state of tension, and its upper part into a state of compression. Between these extremes there is a place, varying with the substance, at which the fibres are neither extended nor compressed—the "neutral axis." From this it follows that any substance in which the power of resisting compression is unequal to the power of resisting tension, cannot be subject to alternating transverse strains, without having a central portion differentiated in its conditions from the outer portions, and consequently differentiated in its structure. If a thick piece of sheet lead be bent from side to side till it is broken, the surface of fracture will exhibit an unlikeness of texture between the inner and outer parts.

255. This seemingly irrelevant truth fundamentally concerns us. Assuming an animal still simpler than the *Amphioxus*, to have a feeble power of moving itself through the water by the undulations of its body, the habitual alternate flexions will have a tendency to mark off from the outer parts an unlike inner part, which will be seized hold of, maintained, and further modified, by natural selection. For such an internal resistant mass will be advantageous in preventing collapse of the body under the action of the external muscular fibres. Though there are difficulties in tracing out the process in a specific way, these difficulties may be much more fully met than at first sight seems possible. The segmentation of the lateral muscular masses of vertebrates also follows from this mechanical hypothesis; for the definite divisions, which flexion establishes, will advance inwards as the layers develop; and will so produce a series of muscular bundles.

256. Taking into account the habitual formation of denser tissues at those parts of an organism which are exposed to the greatest strains; we may expect, on tracing up the evolution of the vertebrate axis, to find, as we do

find, that as the muscular power becomes greater there arise larger and harder masses of tissue, serving the muscles as *points d'appui;* and that these arise first in those places where the strains are greatest. As the muscular segmentation must begin externally and progress inwards, so, too, must the vertebral segmentation.

257. The process of eventual segmentation in the spinal axis may now be understood. If, as facts warrant us in supposing, a formation of denser substance occurs at those parts of the notochord where the strain is greatest; it is clear that the perpetual flexions will prevent the formation of a continuous mass. If matter that will not yield at each bend, is deposited while the bendings are continually taking place, the bendings will maintain certain places of discontinuity in the deposit: places at which the whole of the stretching will be concentrated. And thus the tendency will be to form segments of hard tissue capable of great resistance to compression, with intervals filled by elastic tissue capable of great resistance to extension—a vertebral column. The progress of ossification conforms to this view.

258. In the course of evolution, both as displayed in the *Vertebrata* generally and in each vertebrate embryo, three skeletons succeed one another—the membranous, the cartilaginous, and the osseous. The mechanical hypothesis shows why, in the course of evolution, a feebly-resisting membranous structure came to be replaced by a more-resisting cartilaginous structure, and this, again, by a still more-resisting osseous structure; and why, therefore, these successive stages succeed one another, as it seems so superfluously, in the vertebrate embryo.

259. Of course the foregoing is to be taken simply as an adumbration of the process by which the vertebrate structure may have arisen through the continued actions of known agencies. The explanation given assigns causes of known kinds producing effects such as they are known to produce; and assimilates the phenomena of vertebral development to much wider classes of morphological phenomena.

XVI. THE SHAPES OF ANIMAL CELLS.

260. Among animals as among plants, the likenesses and unlikenesses of cells are determined by the likenesses and unlikenesses of the incident forces. A conformity that is traceable where the conditions are simple, as in the primitive segmenting embryonic mass.

261. It is needless to examine the evidence of Histology, for the cells composing masses of tissue are severally subject to such indeterminate forces as to render the interpretation of their shapes impracticable. So far as the facts go they are congruous with the hypothesis.

XVII. SUMMARY OF MORPHOLOGICAL DEVELOPMENT.

262. The comprehensiveness of our formula, and its congruity with the laws of the universal redistribution of matter and motion, afford strong evidence of its truth.

263. The morphological differentiation which goes hand in hand with morphological integration, is clearly what the perpetually-complicating conditions would lead us to anticipate. Every addition of a new unit to an aggregate of such units, must alter the distribution of mechanical strains throughout the mass, must modify the process of nutrition, and must initiate a changed incidence of forces tending ever to produce changed structural arrangements.

264. The proposition arrived at when dealing with the causes of Evolution, "that in the actions and reactions of force and matter, an unlikeness in either of the factors necessitates an unlikeness in the effects; and that in the absence of unlikeness in either of the factors the effects must be alike." (*First Principles*, § 169), is the general formula including all those particular likenesses and unlikenesses of parts which we have been tracing. It is an inevitable deduction from the persistence of force, that organic forms which have been progressively evolved must present just those fundamental traits of form which they do present.

CHAPTER VII.

PHYSIOLOGICAL DEVELOPMENT.

"The progressive differentiation of functions similarly traced; and similarly interpreted as consequent upon the exposure of different parts of organisms to different sets of conditions."

I. THE PROBLEMS OF PHYSIOLOGY.

265. How heterogeneities of action have progressed along with heterogeneities of structure, is now the inquiry; in pursuing it, all the specialities with which Physiology usually deals can serve only as materials. We have to trace out the development of the organs by which the functions are known to be discharged—the differentiation and integration of the functions being presumed to have progressed hand in hand with the differentiation and integration of the organs. The facts of structure will now be used to interpret the facts of function, instead of conversely.

266. The problems of Physiology, in the wide sense above described, are, like the problems of Morphology, to be considered as problems to which answers must be given in terms of incident forces. Here, as before, two classes of factors must be borne in mind. The inherited results of actions to which antecedent organisms were exposed, and, joined with these, the results of present actions.

267. The inductive statement and the deductive interpretation may be carried on conjointly: so disposing of each general truth before passing on to the next.

II. DIFFERENTIATIONS BETWEEN THE OUTER AND INNER TISSUES OF PLANTS.

268. Amid all the diversities which vegetal aggregates of the first order display, there is this one uniformity—a strong distinction between the parts in contact with the environment and the parts not in contact with the environment. By direct equilibration, continually furthered by indirect equilibration, there must arise this distinction between the outer part adapted to meet outer forces, and the inner part adapted to meet inner forces. And their respective actions, as thus meeting outer and inner forces, must be what we call their respective functions.

269. Aggregates of the second order exhibit parallel traits, admitting of parallel interpretations. Integrated masses of cells or units homologous with protophytes, habitually exhibit contrasts between the characters of the superficial tissues and the central tissues.

270. The higher plants variously display the like fundamental distinction between outer and inner tissues. Each leaf, thin as it is, exemplifies this. At first the component cells of the leaf are all alike; and the unlikeness between the cells of the outer and inner layers, arises simultaneously with the rise of differences in their conditions—differences that have acted on all ancestral leaves as they act on the individual leaf. An unlikeness more marked in kind but similar in meaning, exists between the bark of every branch and the tissues it clothes.

271. The contrast is not, as might be supposed from the foregoing descriptions, simple: but it is compound. The outer structure itself is usually divisible into concentric structures. This is equally true of a protophyte and of a phanerogamic axis. Between the centre of an independent vegetal cell and its surface, there are at least two layers; and the bark coating the substance of a shoot, besides being itself compound, includes another tissue lying between it and the wood. These contrasted tissues and the contrasted functions

they severally perform are unquestionably subordinated to the relations of outside and inside. The unlike actions of forces involved by the relations of outside and inside, determine these contrasts—partly directly and partly indirectly.

III. DIFFERENTIATIONS AMONG THE OUTER TISSUES OF PLANTS.

272. That the physiological differentiation between the part of a plant's surface which is exposed to light and air, and the part which is exposed to darkness and moisture and solid matter, is primarily due to the unlike actions of these unlike parts of the environment, is clearly implied by observed facts. Considering how strong must be the inherited tendency of a plant to assume those special characters which have resulted from an enormous accumulation of antecedent actions, it may be even thought surprising that this tendency can be counteracted to so great an extent by changed conditions. Such a degree of modifiability becomes comprehensible only on remembering how little a plant's functions are integrated; and how much, therefore, the functions going on in each part may be altered without having to overcome the momentum of the functions throughout the whole plant. But this modifiability being as great as it is, there is no difficulty in understanding how, by the cumulative aid of natural selection, this primary differentiation of the surface in plants has become what it is.

273. The secondary contrasts existing between the different parts of the free surfaces of plants may now be considered. Among the *Algæ*, where the free surfaces are not dissimilarly conditioned—as in *Ulva* and *Fuci* swayed about in all directions by the sea—there is no systematic differentiation; while the dissimilar upper and under surfaces of *Fungi* are related to contrasted conditions. The physiological differentiation of the surface which arises between the axial and foliar organs of Phanerogams is traceable to a similar cause. The fact that without the differential conditions the physiological differentiation does not arise, or is

obliterated, gives clear proof that it is determined by unlikenesses in the relations of the parts to the environment.

274. Leaves display superficial differentiations of structure and function. The upper surfaces of leaves are habitually of a deeper green than the under. Microscopic examination shows that this deeper green results from the closer clustering of those parenchyma-cells full of chlorophyll that are in some way concerned with the assimilative actions; while beneath them are more numerous intercellular passages communicating with those openings or stomata through which is absorbed the needful air. Now when it is remembered that the formation of chlorophyll is clearly traceable to the action of light—that succulent axes and petioles, like those of the Sea-kale and Celery, remain white while the light is kept from them and become green when exposed; it cannot be questioned that this greater production of chlorophyll next to the upper surface of a leaf, is directly consequent on the greater amount of light received. These differentiations must be regarded as in part due to direct equilibration and in part to indirect equilibration. Where leaves grow in approximately upright attitudes, and attitudes which do not maintain the relative positions of the two surfaces with constancy, they display an unusual likeness between the two surfaces.

275. Passing over the contrasts between seed-leaves and the subsequent leaves, submerged and aerial leaves, leaves and bracts, and bracts and sepals; we come to those marked unlikenesses that exist between the tissues of the more characteristic parts of flowers, and the tissues of the homologous foliar organs. The ends of lateral axes, having the most indirect access to the materials furnished by the roots, are consequently the probable points of fructification. And these being the points at which the colours inherited from lower types recur in more marked degrees than elsewhere; it may be inferred that the organs of fructification will not unfrequently coexist with such colours as the ends of these axes. The intensification of these colours may result from insect

agency. Insects most able to discern the parts of plants which afford food will be those most likely to survive and leave offspring. Plants presenting most of the desired food, and showing most clearly where it lies, will have their fertilization and multiplication furthered in the greatest degree. The genesis of the sweet secretions and the odours of flowers is open to a parallel interpretation. These physiological differentiations which mark off the foliar organs of flowers from other foliar organs, are the consequences of indirect equilibration.

276. There is thus weighty evidence that unlike outer actions have caused unlike inner actions, and correspondingly unlike structures; either by changing the functional equilibrium in the individual, or by changing it in the race, or by both.

IV. DIFFERENTIATIONS AMONG THE INNER TISSUES OF PLANTS.

277. After the external and internal parts have become distinguished from one another, there arise distinctions among the internal parts themselves, as well as among the external parts themselves.

278. Facts unite in proving a direct relation between the demand for support and circulation, and the existence of the vascular woody bundles which the higher plants habitually possess. The question is—Under what influences are these structures, answering to these requirements, developed? How are these internal differentiations caused? The inquiry may be conveniently divided. Though the supporting tissues and the tissues concerned in the circulation of liquids are closely connected, and indeed entangled, with one another, the two may fitly be dealt with apart.

279. Many common-place facts indicate that the mechanical strains to which upright-growing plants are exposed, themselves cause increase of the dense deposits by which such plants are enabled to resist such strains. This direct relation between mechanical stress and the formation

of wood, is also shown by the internal distribution of the wood. For the peripheral layers, on which the greatest strain falls, have the largest deposit of resisting substance which the mode of growth permits. In petioles there are significant deviations from this arrangement, showing that where the distribution of forces is different, the distribution of resisting tissue is different. By habitual survival of the fittest, there is established a systematic and constant distribution of a deposit adapted to the circumstances of each type.

280. By what structures is the function of circulation discharged?—and what connexion exists between the demand for the structures and the genesis of them? For two reasons liquid moving through tissues follows the lines in which the elements of the tissues are most elongated. The narrowing of the cells and intercellular spaces which accompanies their elongation, facilitates capillarity; while, at the same time, fewer of the septa formed by the joined ends of the cells have to be passed through. Hence the general fact that the establishment of a rudimentary vascular system, is the formation of bundles of cells lengthened in the direction which the liquid is to take. There is strong evidence to show that this modification, which favours the transfer of liquid towards each place of demand, is itself caused by the current which the demand sets up. The stream makes its own channel. There are also grounds for thinking that the further transformations by which these elongated cells pass into spiral, annular, reticulated, or other frameworks, are also determined by the currents of sap carried. To attempt any physical interpretation of this change is scarcely safe: the conditions are so complex. There are many reasons for suspecting, however, that it arises from a vacuolation of the substance deposited on the cell wall.

281. Through what physical actions are these adjustments of tissues and distributions of nutritive liquid established? When any part of a plant is bent by the wind, the tissues on its convex side are subject to tension, driving the sap along the canals upwards and downwards, or through the

porous canal walls into the surrounding tissue, thus supplying it with assimilable materials. This rude pumping process serves to propel the sap to heights which it could not reach by capillary action, at the same time that it incidentally serves to feed, and thus to strengthen, the parts in which it takes place. It must not be supposed that intermittent mechanical strains are the sole cause of wood formation in the individual plant, for the inherited tendency to form wood is manifestly the chief cause.

282. The leading internal differentiations of plants are thus interpretable as consequent on a direct equilibration between inner and outer forces. The relation between the demand for liquid and the formation of channels that supply it, as well as between the incidence of strains and the deposit of substance that resists them, are among the clearest special examples of the general truth that the moving equilibrium of an organism, if not overthrown by an incident force, must eventually be adjusted to it. Various less conspicuous changes must here be passed over as arising in ways too involved to admit of specific interpretations.

V. PHYSIOLOGICAL INTEGRATION IN PLANTS.

283. Plants do not display integration in such distinct and numerous ways as do animals. But its advance may be traced directly in the increasing co-ordination of actions, and indirectly in the effect of this upon the powers and habits.

284. The *Algæ*, Fungi, and Lichens, exhibit little mutual dependence of parts. In the Acrogens there arises a decided physiological integration, which reaches its climax among Endogens and Exogens. Along with specialized appliances for support and transfer, there is an exchange of aid at great distances; as in roots holding the vast aerial growth, and supplying water enough for their nutrition even during periods of drought. More conspicuous still is the integration which holds together the functions not of

the individual only, but of the species as a whole. The organs of reproduction, both in their relations to other parts of the individual bearing them, and in their relations to corresponding parts of other individuals, show an integration conducing to the better preservation of the race.

285. The advance of physiological integration among plants of the higher types, is implied by their greater constancy of structure, as well as by the stricter limitation of their habitats and modes of life. "Complexity of structure is generally accompanied with a greater tendency to permanence in form:" says Dr. Hooker; or, conversely, "the varying species . . . are the simplest in structure." (*The Flora of Australia.* 1859. pp. v—vi.)

286. It is hardly practicable to say definitely by what process this co-ordination of functions, which accompanies their specialization, is brought about. The total results must be regarded as due to a plexus of influences acting simultaneously on the individual and on the species.

VI. DIFFERENTIATIONS BETWEEN THE OUTER AND INNER TISSUES OF ANIMALS.

287. Among *Protozoa*, as among *Protophyta*, the first definite contrast of parts is that which arises between outside and inside.

288. The early establishment of this primary contrast of tissues answering to this primary contrast of conditions, is no less conspicuous in aggregates of the second order. The feebly integrated units of a Sponge, with individualities so little merged in that of the whole they form that most of them still retain their separate activities, nevertheless exhibit, in the unlikeness that arises between the outermost layer and the contained mass, the effect of converse with unlike conditions.

289. The duplicated surfaces which every simple cœlenterate animal displays, are re-duplicated in all animals of higher classes—the more developed *Cœlenterata* themselves show-

ing the transition. "Compared with the Hydroid Polypes," says Prof. Huxley, "the higher forms are double animals, and a section of their bodies is, morphologically speaking, like a section of two *Hydræ*, one contained within the other." (*Cyclopædia of Anatomy*, R. B. Todd. 1859. Vol. V, p. 475.)

290. Whether direct equilibration or indirect equilibration has had the greater share in producing this universally-present contrast between the inner and outer tissues of animals, must be left undecided. The two causes have all along co-operated. As in plants so in animals, the universally-present layer whence epidermis grows outwardly and connective tissue inwardly, may be regarded as the place of equilibrium between the two antagonist forces. To increase the mechanical action or chemical irritation at some part of an animal's surface, is to make this plane of indifferent tissue retreat inwardly: for to say that the epidermis becomes thicker, is, in mechanical terms, to say that the plane of equilibrium between outer and inner forces is further from the surface.

VII. DIFFERENTIATIONS AMONG THE OUTER TISSUES OF ANIMALS.

291. The outer tissues of animals, originally homogeneous over their whole surfaces, pass into a state of heterogeneity which fits their respective parts to their respective conditions. Here it must suffice to glance at the illustrations furnished by the higher animals only.

292. Though we ordinarily think of respiration as the quite special function of a quite special organ, yet originally it is not so. Little-developed animals part with their carbonic acid and absorb oxygen, through the general surface of the body. Even in the lower types of the higher classes, the general surface of the body aids largely in aerating the blood, and the parts that discharge the greater portion of this function are substantially nothing more than slightly altered and extended portions of the skin. In what way are such differentiations established? Partly, no doubt, by natural

selection; but also, to some degree, by the inheritance of direct adaptations.

293. By what physical processes do pressure and friction bring about dermal hardenings? As in plants we saw that intermittent compressions of sap-canals increase the exudation of sap, and thus cause increased deposits of its contained substances in the surrounding tissues; so in animals, there is good reason for concluding that intermittent compressions of the capillaries increase the exudation of serum, and by thus supplying extra nutriment to the structures adjacent, lead, other things being equal, to thickening or induration. In animals therefore, as in plants, the external mechanical actions to be resisted, are themselves directly instrumental in working in the tissues they fall upon, the changes which fit those tissues to meet them. And it needs but to contemplate the process of thickening described, to see that it will go on until the shield produced suffices to protect the capillaries from excessive pressures—will go on, that is, until there is equilibrium between the outer and inner forces.

294. Readers who are unfamiliar with the extreme modifiability of organic structures, will be startled by the proposition that hairs, feathers, quills, and scales, are homologous parts. Inspection of a few cases would show however, that this seemingly incredible proposition is obviously true. They are developed mainly, if not wholly, by the actions of external causes on species rather than on individuals.

295. Whether the differentiations by which organs of sense are formed are due wholly to indirect equilibration, or whether direct equilibration has had a share in developing them, are questions that must be left open. Possibly a short hair so placed on a mammal's face as to be habitually touched, may, by conveying excitations to the nerves and vessels at its root, cause extra growth of the bulb and its appendages, and so the development of a *vibrissa* may be furthered. Possibly too, the light itself, to which the tissues of some inferior animals are everywhere sensitive, may aid in setting up certain of the modifications by which the nervous parts of

visual organs are formed—producing, as it must, the most powerful effects at those points on the surface which the movements of the animal expose to the greatest and most frequent contrasts of light and shade; and propagating from those points currents of molecular change through the organism. But it seems clear that the complexities of the sensory organs are not thus explicable. They must have arisen by the natural selection of favourable variations.

296. The transition from the literally outer tissues to those tissues that are intermediate between them and the truly inner tissues, is visible at all the orifices of the body: where skin and mucous membrane are continuous, and the one passes insensibly into the other. These literally outer and *quasi*-outer layers rapidly assume one another's structures and functions when subject to one another's conditions.

VIII. DIFFERENTIATIONS AMONG THE INNER TISSUES OF ANIMALS.

297. The successive parts of the alimentary canal in the higher animals are so placed with respect to its contents, that the physical and chemical changes undergone by its contents while passing from one end to the other, inevitably transform its originally homogeneous surface into a heterogeneous surface. Clearly, the effect produced on the food at any part of the canal by trituration, by adding a secretion, or by absorbing its nutritive matters, implies the delivery of the food into the next part of the canal in a state more or less unlike its previous states—implies that the surface with which it now comes in contact is differently affected by it from the preceding surfaces—implies, that is, a differentiating action. If the food is changed at all in the course of its transit, which it must be if the creature is to live by it, then it cannot but act dissimilarly on the successive tracts of the alimentary canal, and cannot but be dissimilarly reacted on by them. Not, indeed, that this process of direct equilibration can be regarded as the sole

process. For indirect equilibration aids; and, doubtless, there are some of the modifications which it only can accomplish.

298. The liver, pancreas, and various smaller glands, all arise by differentiation from the coats of the alimentary canal. Among the various waste products continually escaping from the living tissues, some are likely to set up changes which may either aid or hinder the preparation of the food for absorption. If an effete matter, making its exit through the wall of the intestine, hinders the digestive process, the enfeeblement and disappearance of individuals in which this happens, will prevent the intestine from becoming the established place for its exit. While if it aids the digestive process, the intestine will, for converse reasons, become more and more the place to which its exit is limited. Equally manifest is it, that if there is one part of the alimentary canal at which, more than at any other part, the favourable effect results, this will become the place of excretion. Once this place of excretion is established, the development of the gland is simply a question of time and natural selection.

299. Comparative anatomy and embryology unite in showing that a lung is formed by the growth of a hollow bud into the perivisceral cavity. The interior of this bud is simply a *cul-de-sac* of the alimentary canal; and its development into an air-chamber, an extension and specialization of its substance. There is a clue to this specialization of the internal surface, for converse with a medium to which it is not naturally exposed, in the fact that the common Loach is well known to swallow air, which it afterwards discharges loaded with carbonic acid. A faculty of great importance to inhabitants of little-aerated and shallow waters. This habit must be regarded as arising accidentally during the effort to obtain the most aerated water; as persevered in because of the relief obtained; and as growing by repetition into a tendency which is bequeathed to offspring, and by them, or some of them, increased and transmitted. Some favourable variation in the shape of the canal being the initial step

favouring the lodgment of such bubbles. It is probable that the gradual increase of this structural modification, by the survival of individuals in which it is carried furthest, will all along be aided by immediate adaptation.

300. Turning to the differentiations among the truly inner tissues; the genesis of the primordial heart is not comprehensible as a result of direct equilibration; or of indirect equilibration. A contractile tube that aided the distribution of nutritive liquid, being once established, survival of the fittest would suffice for its gradual extension and its successive modifications. But what were the early stages of the contractile tube, while it was yet not sufficiently formed to help circulation? We cannot say. If the question be asked —What is the origin of those ramifying channels which, first appearing as simple channels, eventually become vessels having definite walls? A reply admitting of considerable justification, is, that the currents of nutritive liquid, forced and drawn hither and thither through the tissues, themselves initiate these channels. It has been seen that the development of sap-channels in plants conforms to this general principle. May we not then suspect that the nutritive liquid contained in the tissue of a simple animal, made to ooze now in this direction and now in that, by osmotic distension and by the changes of pressure which the animal's movements cause, comes to have certain lines along which it is thrust backwards and forwards more than along other lines; and must by repeated passings make these more and more permeable, until they become lacunæ? Such actions will inevitably go on; and such actions appear competent to produce some, at least, of the observed effects.

301. The problem as to the differentiation of bone is an involved one, for the effects of mechanical actions differ with each of its three stages of development, the membranous, cartilaginous, and osseous. The formation of dense tissue in certain other cases was shown to result indirectly from the alternate squeezing and relaxation of the vessels running through the part. Can the same actions go on in developing

bone in such ways as to produce the observed effects? Every time a mass of cartilage is strained, the diffused nutritive liquid, compressed as it must be, will tend to ooze from the surface and to return again when the stress is taken off. It will be apt to form channels, and eventually to form a vascular layer of appreciable thickness. Now, considering that cartilage is elastic, it follows that the capillaries on the convex side will be laterally squeezed, and that there will be an exudation of serum into the adjacent cartilage: and consequently, extra nutrition and increase of strength. Having yielded on one side, the bone yields again towards the same side when again longitudinally pressed. Hence the substance of its concave side, never rendered convex by a bend in the opposite direction, would not receive extra nutrition did no other action come into play. But consideration shows that on the side of the unossified bone, made concave in the way described, the compressed cartilage will squeeze the capillaries traversing it, and will cause extra exudation from the capillaries into the cartilage. Thus every additional strain will give an additional supply of the materials for growth. So that presently the weakest side will cease to be the weakest, and will cause some other side to yield, where this same process will be again repeated, and so on. Whatever be the strains, the outer parts of the bone will be more affected by them than its inner parts. They will therefore tend everywhere to produce resisting masses having outer parts more dense than their inner parts. These actions, described as taking place in the bone of an individual, must be understood as producing their total effect little by little in the corresponding bones of a long series of individuals. Even if but a small modification can be so wrought in the individual, yet if such modification, or a part of it, be inheritable, it may be readily understood how, in the course of geologic epochs, the observed structures may arise in the assigned way. The only assignable cause in the case of the skull and various dermal bones, appears to be the natural selection of favourable variations.

302. What is the origin of nerve? That the property specially displayed by nerve, is a property which protoplasm possesses in a lower degree, is manifest. The sarcode of a Rhizopod exhibits movements that imply a propagation of stimulus from one part of the mass to another; and through the nerveless body of a polype, may be seen travelling and spreading a contraction set up by touching a tentacle: a contraction which implies the passage from part to part of some stimulus causing the contraction. The probable origin of this phenomenon appears to be in the extreme instability of the organic colloids of which protoplasm consists. These, in common with colloids in general, assume different isomeric and polymeric forms with great facility. Further, this readiness to undergo molecular rearrangement, habitually shows itself in colloids by the rapid propagation of the rearrangement from part to part. With matter in this state, a touch will often transform an entire mass. That is to say, the change of molecular state once set up at one end, spreads to the other—there is a progress of a stimulus to change; and this is what is seen in a nerve. Some slight idea may be gathered from this how nervous tissue is differentiated.

303. A speculation akin to, and continuous with, the last, is suggested by an inquiry into the origin of muscular tissue. Contractility, as well as irritability, is a property of protoplasm or sarcode; and it is not improbably due to isomeric change in one of its component colloids. The colloid out of which muscle originates, may be one that readily passes into an isomeric state in which it occupies less space: the molecular disturbance causing this contraction being communicated to it from adjacent portions of nerve-substance that are molecularly disturbed; or being otherwise communicated to it by direct mechanical or chemical stimuli. What causes the specialization of contractile substance?—What causes the growth of colloid masses which monopolize this contractility, and leaves kindred colloids to monopolize other properties? Has natural

selection gradually localized and increased the primordial muscular substance? Or has the frequent recurrence of irritations and consequent contractions at particular parts done it? There is reason to conclude that direct, rather than indirect, equilibration has been chiefly operative. A portion of undifferentiated tissue containing a predominance of the colloid that contracts in changing, will, during each change, tend to form new molecules of its own type from the other colloids diffused through it: the tendency of these entangled colloids to fall into unity with those around them, will be aided by every shock of isomeric transformation. Hence, repeated contractions will further the growth of the contracting mass, and advance its differentiation and integration.

304. It is not unreasonable to presume that these co-operative processes of direct and indirect equilibration will account for the less important internal differentiations. A few words may be appropriately added on the repair and growth of the differentiated tissues. If any tissue that consumes, transforms, excretes, or secretes matters that pass into it from the blood, is not formed of the same constituents as these matters it tranforms or excretes; or if it does not undergo waste proportionate to the quantity of matter it transforms or excretes; then it may fairly be inferred that along with any unusual quantity of such matters to be transformed or excreted, the plasma passing into it must bring a surplus of the materials for its own repair and growth.

IX. PHYSIOLOGICAL INTEGRATION IN ANIMALS.

305. Physiological differentiation and physiological integration, are correlatives that vary together. Here the inquiry is—What causes the integration to advance *pari passu* with the differentiation?

306. A general idea of the co-ordination of functions that accompanies their specialization, is obtained by observ-

ing the slowness with which a little-differentiated animal responds to a stimulus applied to one of its parts, and the rapidity with which such a local stimulus is responded to by a more differentiated animal. A tentacle of a Polype, when touched, slowly contracts; and if the touch has been rude, the contraction presently extends to the entire body. But on touching the tentacle of a Polyzoon, the whole cluster of tentacles is instantly withdrawn, along with the protruded part of the creature's body, into its sheath.

307. If a *Hydra* is cut in two, the nutritive liquids diffused through its substance cannot escape rapidly, since there are no open channels for them; and hence the condition of parts at a distance from the cut is but little affected. But where, as in the more-differentiated animals, the nutritive liquid is contained in vessels that have continuous communications, cutting the body is followed by escape of the liquid from these vessels to a large extent; and this affects the nutrition and efficiency of organs remote from the place of injury. Where there exists in addition an apparatus for propelling the blood, the entire organism is soon prostrated. Hence, a completely-differentiated vascular system integrates all members of the body, by making each dependent on the integrity of the vascular system, and therefore on the integrity of each member through which it ramifies.

308. A higher form of physiological integration is that which the nervous system effects. Each part as it becomes specialized, begins to act upon the rest not only indirectly through the matters it takes from and adds to the blood, but also directly through the molecular disturbances it sets up and diffuses. Whether nerves themselves are differentiated by the molecular disturbances thus propagated in certain directions, or whether they are otherwise differentiated, it must equally happen that as fast as they become channels along which molecular disturbances travel, the parts they connect become physiologically integrated, in so far that a change in one initiates a change in the other.

309. For a great part of the physiological union that accompanies the physiological specialization, the process of direct equilibration appears to be a sufficient cause; and indirect equilibration may be fairly presumed a sufficient cause for that which remains.

X. SUMMARY OF PHYSIOLOGICAL DEVELOPMENT.

310. It will be well here more particularly to observe the relation of the facts of physiological development to the universal course of the redistribution of matter and motion.

311. The instability of the homogeneous, or, strictly speaking, the inevitable lapse of the more homogeneous into the less homogeneous, which was before endlessly exemplified by the morphological differentiations of the parts of organisms, has been here afresh exemplified, in ways also countless, by the physiological differentiations of their parts. And in the one case as in the other, this change from uniformity into multiformity in organic aggregates, is caused, as it is in all inorganic aggregates, by the necessary exposure of their component parts to actions unlike in kind, or quantity, or both. General proof of this is furnished by the order in which the differences appear. If parts are rendered physiologically heterogeneous by the heterogeneity of the incident forces; then the earliest contrasts should be between parts that are the most strongly contrasted in their relations to incident forces; the next contrasts should occur where there are the next strongest contrasts in these relations; and so on. The evidence shows that they do this. Physiological development is initiated by that instability of the homogeneous which has been shown to be everywhere a cause of evolution. (*First Principles*, §§ 149-155.)

312. Throughout physiological development, as in evolution at large, the multiplication of effects has been a factor constantly at work, and working more actively as the development has advanced. The secondary changes

wrought by each primary change, have necessarily become more numerous in proportion as organisms have become more complex. Every increased multiplication of effects has prepared the way for still higher differentiations and integrations similarly caused.

313. The changes which have been contemplated are but the concomitants of a progressing equilibration. In every aggregate the instability of the homogeneous is but another name for the absence of balance between the incident forces and the forces which the aggregate opposes to them; and the passage into heterogeneity is the passage towards a state of balance. Similarly, the multiplication of effects implies that one part which has a fresh force impressed upon it, must go on changing and communicating secondary changes, until the whole of the impressed force has been used up in generating equivalent reactive forces.

314. In all which universal laws, we find ourselves again brought down to the persistence of force, as the deepest knowable cause of those modifications which constitute physiological development; as it is the deepest knowable cause of all other evolution.

CHAPTER VIII.

THE LAWS OF MULTIPLICATION.

"Generalizations respecting the rates of reproduction of the various classes of plants and animals; followed by an attempt to show the dependence of these variations upon certain necessary causes."

I. THE FACTORS.

315. As in all other respects an adaptation of each species to its conditions of existence is directly or indirectly brought about; so must there be brought about an adaptation of its reproductive activity.

316. Every living aggregate being one of which the inner actions are adjusted to balance outer actions, it follows that the maintenance of its moving equilibrium depends on its exposure to the right amounts of these actions. Its moving equilibrium may be overturned if one of these actions is either too great or too small in amount: either by excess or defect of some inorganic or organic agency in its environment.

317. Each individual may meet these varying agencies in two essentially different ways: either by an ability to adjust itself directly to them, or by the power of producing new individuals to replace those overthrown. This latter power depends on four varying factors:—The age at which reproduction commences; the frequency with which broods are produced; the number contained in each brood; and the length of time during which broods are produced. The amount of parental aid given to each germ must also be taken into account.

318. These conflicting sets of actions may be generalized as—the forces destructive of race, and the forces preservative of race. What are the necessary implications?

II. *A PRIORI* PRINCIPLE.

319. Our inquiry resolves itself into this:—In races that continue to exist, what laws of numerical variation result from these variable conflicting forces?

320. As the balance between these two sets of forces cannot be maintained in every continuously-existing species by providential interposition; it must be self-sustaining. It must be of the kind distinguished as a stable equilibrium.

321. How can such an equilibrium be constituted? When from favourable causes any species becomes more numerous than usual, the creatures that thrive at its expense increase too, until they are in excess, whereupon results a decrease of the species, which will continue until by starvation the enemies are reduced to a minimum. Whence the species will again increase, and so on, rhythmically, as wherever antagonistic forces are in action. (*First Principles*, §§ 85, 173.)

322. The minor adjustments of varying multiplication to varying mortality in each species, implies some major adjustment of average multiplication to average mortality. We have already seen that the forces preservative of race are two—ability in each member of the race to preserve itself, and ability to produce other members. These must vary inversely: one must decrease as the other increases.

323. Leaving out the untenable hypothesis of a supernatural pre-adjustment, we have to ask in what way this adjustment comes about as a result of Evolution.

III. OBVERSE *A PRIORI* PRINCIPLE.

324. It was shown that Genesis "is a process of . . . disintegration; and is thus essentially opposed to that process of integration, which is an element of individual

evolution." (*Biology*, § 76.) Each new individual is a deduction from the mass of one or of two pre-existing individuals.

325. The disintegration of genesis may be such that the parent dissolves wholly into progeny; or, maintaining its own identity, may continue indefinitely to produce offspring; or, growth and development continuing for a long time, the parent may die from an excessive loss of nutritive materials; or, again, there may be sufficient vital capital for the parental life to continue.

326. The opposite side of this antagonism has also several aspects. Progress of organic evolution may be shown in increased bulk, in increased structure, in increased amount or variety of action, or in combinations of these; and under any of its forms this carrying higher of each individuality, implies a correlative retardation in the establishment of new individualities. As an animal gains power to support itself and to cope with surrounding dangers, it must lose power to propagate.

327. Including under Individuation, all those processes completing and maintaining individual life, and under Genesis, all those aiding the formation and perfecting of new individuals; the two are necessarily antagonistic. Every higher degree of individual evolution is followed by a lower degree of race multiplication, and *vice versâ*. Progress in bulk, complexity, or activity, involves retrogress in fertility; and progress in fertility involves retrogress in bulk, complexity, or activity. For the present it will suffice to regard this inverse variation of Individuation and Genesis as exact.

328. If these *a priori* inferences are true, there must be an agreement between them and the observed facts. How far is such an agreement traceable?

IV. DIFFICULTIES OF INDUCTIVE VERIFICATION.

329. It will be well to glance first at the chief difficulties of inductive verification; so that the kind of verification which is alone possible may be seen.

330. Either absolutely, or relatively to any species, every environment differs more or less from every other. Comparisons are interfered with by unlikenesses of media—air, water, earth, organic matter; by climate—heat and light; by permanent differences in the natures and distributions of aliment; and by inequalities in relations to enemies.

331. Self-preservation, again, requires extremely unlike expenditures of force. The cost of locomotion, the heat-consumption, and the dissimilarities of attack and defence, are all causes of variation in the outlay for self-maintenance.

332. The qualifying considerations become still more entangled on contrasting species in their powers of multiplication. Were all multiplication carried on sexually, the problem would be less involved; but there are many kinds of asexual multiplication alternating with the sexual. The assumption has also to be avoided, that the cost of Genesis is measured by the number of young produced, instead of being measured, as it is, by the weight of nutriment abstracted to form the young, *plus* the weight consumed in caring for them.

333. To ascertain by comparison of cases whether Individuation and Genesis vary inversely, is thus beset with difficulties. Any satisfactory results might be despaired of were not the relation so marked.

V. ANTAGONISM BETWEEN GROWTH AND ASEXUAL GENESIS.

334. Our subject is the antagonism of Individuation and Genesis: that the same quantity of matter may be divided into many small wholes or few large wholes; but that number negatives largeness and largeness negatives number.

335. Not forgetting that certain Phanerogams, as *Begonia phyllomaniaca*, revert to quite primitive modes of increase, it is unquestionable that while among the most minute plants asexual multiplication is universal, and produces enormous numbers in short periods—as the Yeast fungus—it becomes step by step more restricted in range and

frequency as we advance to large and compound plants; and disappears so generally from the largest, that its occurrence is regarded as anomalous.

336. Parallel examples showing the inverse variation of growth and asexual genesis among animals, make clear the purely quantitative nature of this relation under its original form. Among the *Protozoa*, as among the *Protophyta*, there occurs that process by which the individuality of the parent is wholly lost in producing offspring—the breaking up of the parental mass into a number of germs. Of animal aggregates belonging to the second order, that multiply asexually with rapidity, the familiar Polypes furnish conspicuous examples. The evidence from the *Vertebrata* may be very briefly summed up. On the one hand, whether looked at in the aggregate or in its particular species, it immensely exceeds all other classes in the sizes of its individuals; and on the other hand, agamogenesis under any form is absolutely unknown in it.

337. That the smallest organisms habitually reproduce asexually with immense rapidity; that the largest organisms never reproduce at all in this manner; and that between these extremes there is a general decrease of asexual reproduction along with an increase of bulk; are propositions that admit of no dispute.

VI. ANTAGONISM BETWEEN GROWTH AND SEXUAL GENESIS.

338. Sexual genesis, equally with asexual genesis, is opposed to that aggregation which results in growth.

339. In the lowest vegetal forms, sexual propagation completely sacrifices the parental life, and is the concomitant of a prodigious fertility. Among the larger *Fungi* there is a similar subordination of the individual to the race, and a similarly-immense fertility. On the average, tertiary vegetal aggregates are far larger than those of a lower degree of composition; and on the average their rates of sexual reproduction are far less. Similarly, if the smaller types of

Acrogens, Endogens, and Exogens, be compared with the larger, they are proportionately more prolific.

340. Our knowledge of the primary animal aggregates is so rudimentary that they must be passed over. Among small aggregates of the second order, the *Planaria* supplies a good example of the relation between small size and active gamogenesis. Perhaps the best examples are supplied by vertebrate animals, and especially those that are most familiar to us. The Pheasant has from 6 to 10 eggs, the Grouse 8 to 12, the Partridge 10 to 15, the Quail still more, sometimes reaching 20. Though in the sizes of their broods the Turkey and the Fowl do not greatly differ, the Fowl begins breeding at a much earlier age than the Turkey, and produces broods more frequently: a considerably higher rate of multiplication being the result. If a specific comparison be desired between Mammals that are similar in constitution, in food, in conditions of life, and all other things but size, the Deer-tribe supplies it. While the large Red-deer has but one at a birth, the small Roe-deer has two at a birth.

341. The antagonism between growth and sexual genesis may also be traced in the history of each plant and animal. It is a general physiological truth that while the building-up of the individual is going on rapidly, the reproductive organs remain imperfectly developed and inactive; and that the commencement of reproduction at once indicates a declining rate of growth, and becomes a cause of arresting growth.

342. Notwithstanding the way in which the inverse variation of growth and sexual genesis is complicated with other relations, the results are unmistakeable when the comparisons are made between the largest and the smallest types, whether vegetal or animal.

VII. THE ANTAGONISM BETWEEN DEVELOPMENT AND GENESIS, ASEXUAL AND SEXUAL.

343. It has now to be noted how complexity of organ-

ization is hindered by reproductive activity, and conversely. It is true that higher structure, like greater growth, may insure to a species advantages that eventually further its multiplication. But here we are concerned only with the necessary and direct effects.

344. Speaking generally, the simpler plants propagate both sexually and asexually; and, speaking comparatively, the complex plants propagate only sexually: their asexual propagation being usually incomplete.

345. In the animal kingdom, the *Hydra* shows how rapidity of agamic propagation is associated with inferiority of structure. Its power to produce young ones from nearly all parts of its body, is due to the comparative homogeneity of its body. In kindred but more-organized types, the gemmiparity is greatly restricted, or disappears.

346. The inverse variation is difficult to follow. It may be pointed out, however, that the concomitant of higher organization in Phanerogams is a slower gamogenesis. It is not improbable that the smallness of human fertility, compared with the fertility of large feline animals, is due to the greater complexity of the human organization—more especially the organization of the nervous system.

VIII. ANTAGONISM BETWEEN EXPENDITURE AND GENESIS.

347. The facts here to be mainly depended upon, are those to be gathered from the higher terrestrial animals about which our knowledge is tolerably definite.

348. Satisfactory proof that loss of substance in the maintenance of heat diminishes the rapidity of propagation, is difficult to obtain. The common Fowl, however, yields an illustration. It is fed through the cold months, but nevertheless, in mid-winter, it either wholly leaves off laying or lays very sparingly. If it lays sparingly, it does so only on condition that the heat, as well as the food, is artificially maintained.

349. Of the inverse variation between activity and gene-

sis, there is clear proof. We have the average contrast between the fertility of Birds and the fertility of Mammals. Comparing the large with the large and the small with the small, shows that creatures which continually go through the muscular exertion of sustaining themselves in the air and propelling themselves rapidly through it, are less prolific than creatures of equal weights which go through the smaller exertion of moving about over solid surfaces.

350. Turning to Mammals, the extreme infertility of our common Bat is most striking, when compared with the structurally similar but very prolific mouse; a difference in the rate of multiplication which may fairly be ascribed to the difference in the rate of expenditure.

351. Variations of expenditure are also related to variations of fertility. When hens begin to moult they cease to lay. While they are expending so much in producing new clothing, they have nothing to expend for producing eggs.

IX. COINCIDENCE BETWEEN HIGH NUTRITION AND GENESIS.

352. That power of propagation is augmented by making self-maintenance unusually easy, has now to be shown. This holds both of agamogenesis and of gamogenesis.

353. On multi-axial plants, the primary effect of surplus nutriment is a production of large and numerous leaf-shoots. In animals, the *Hydra tuba* buds out young polypes with a rapidity proportionate to the supply of materials.

354. The sexual multiplication of organisms under changed conditions, undergoes variations conforming to a parallel law. Though the starved plant may blossom, yet many of its blossoms will fail; and such seeds as it produces will be ill-furnished with those structures and materials needful for successful germination. Hence the number of surviving offspring will be diminished. That abundant nutriment raises the rate of multiplication in Mammals, is evident from the facts that, on the high and

comparatively infertile Cotswolds, it is unusual for Ewes to have twins; while they very commonly have twins in the adjacent rich valley of the Severn.

355. Many facts may be brought to prove that fatness is not accompanied by fertility but by barrenness; and the inference drawn is that high feeding is unfavourable to genesis. A misconception arising partly from the circumstance that the increase of bulk produced by fat is somewhat like the increase of bulk which growth of tissues causes; and partly from the circumstance that abundance of good food normally produces a certain quantity of fat, which, within narrow limits, is a valuable store of force-evolving material. Limiting the phrase high-nutrition, however, to its proper meaning—an abundance of, and due proportion among, all the substances which the organism needs—shows that, other things being equal, fertility always increases as nutrition increases.

X. SPECIALITIES OF THESE RELATIONS.

356. Crucial proofs of these general doctrines are afforded by organisms having modes of life that diverge widely from ordinary modes.

357. Plant-parasites which, like the *Rafflesiaceæ*, live on the juices they absorb from other plants, are very fertile.

358. Similarly with animal-parasites. Along with the decreased cost of Individuation, they display an increased expenditure for Genesis; and show this in the most striking manner where the deviation from ordinary conditions of life is the greatest.

359. Extremely significant is the pseudo-parthenogenesis and metagenesis displayed by such Insects as the *Aphides* and *Cecidomia*-larva. For where a reversion to agamogenesis does take place, there the food is unusually abundant and the expenditure unusually small.

360. The physiological lesson taught us by Bees and Ants, not quite harmonizing with the moral lesson they are

supposed to teach, is that highly-fed idleness is favourable to fertility, and that excessive industry has barrenness for its concomitant.

361. Thus the devotion of nutriment to race-preservation, is carried furthest where the cost of self-preservation is reduced to a minimum; and, conversely, that nothing is devoted directly to race-preservation by individuals on which falls an excessive expenditure for self-preservation and preservation of other's offspring.

XI. INTERPRETATION AND QUALIFICATION.

362. Derived as the self-sustaining and race-sustaining forces are from a common stock of force, it necessarily happens that, other things being equal, increase of the one involves decrease of the other. It may therefore be set down as a law, that every higher degree of organic evolution, has for its concomitant a lower degree of that peculiar organic dissolution which is seen in the production of new organisms.

363. How is the ratio between Individuation and Genesis established in each case? 'All specialities of the reproductive process are due to the natural selection of favourable variations. Given a certain surplus available for race-preservation, and it is clear that by indirect equilibration only, can there be established that peculiar distribution of this surplus which is seen in each case.

364. Here, a qualification must be made. Recognizing the truth that every increment of evolution which is appropriate to the circumstances of an organism, brings an advantage somewhat in excess of its cost; the general law, more strictly stated, is, that Genesis decreases not quite so fast as Individuation increases. The result of greater Individuation—whether it takes the form of greater strength, higher speed, facilitates some habitual movement, or utilizes better the absorbed aliment—is a greater surplus of vital capital; part of which goes to the aggrandizement of the

individual, and part to the formation of new individuals. Hence every type that is best adapted to its conditions, has a rate of multiplication that insures a tendency to predominate. Survival of the fittest, acting alone, is ever replacing inferior species by superior species. But beyond the longer survival, and therefore greater chance of leaving offspring, which superiority gives, we see here another way in which the spread of the superior is insured. Though the more evolved organism is the less fertile absolutely, it is the more fertile relatively.

XII. MULTIPLICATION OF THE HUMAN RACE.

365. What causes increase or decrease of genesis in other creatures, causes increase or decrease of genesis in Man. It is true that, even more than hitherto, our reasonings are here beset by difficulties. So numerous are the inequalities in the conditions, that but few unobjectionable comparisons can be made. The human races differ not only in their sizes, foods, and in the climates they inhabit; but also their expenditures in bodily and mental action are extremely unequal.

366. The increase of fertility caused by a nutrition that is greatly in excess of the expenditure, is to be detected by comparing populations of the same race, or allied races, one of which obtains good and abundant sustenance much more easily than the other. On carrying out such comparisons, it is seen that, in the human race, as in all other races, such absolute or relative abundance of nutriment as leaves a large excess after defraying the cost of carrying on parental life, is accompanied by a high rate of genesis.

367. It is also apparent that relative increase of expenditure, leaving a diminished surplus, reduces fertility. That infertility is generally produced in women by mental labour carried to excess, is shown in the fact that most of the flat-chested girls who survive their high-pressure education, are incompetent to bear a well-developed infant, and to

supply it with the natural food for the natural period. It is a matter of common remark how frequently men of unusual mental activity leave no offspring.

368. It is likely to be urged that since the civilized races are, on the average, larger than many of the uncivilized races; and since they are also somewhat more complex as well as more active; they ought, in conformity with the alleged general law, and other things being equal, to be less prolific. But other things are not equal; and it is to the inequality of other things that this apparent anomaly is attributable.

369. One more objection has to be met. Cases may be named of men conspicuous for activity, bodily and mental, who were also noted, not for less generative power than usual, but for more. The cases are analogous to some before named, in which more abundant food simultaneously aggrandizes the individual and adds to the production of new individuals—the differences between the cases being, that instead of a better external supply of materials there is here a better internal utilization of materials. Some peculiarity of organic balance, some potency of the digestive juices, gives to the system a perpetual high tide of rich blood, that serves at once to enhance the vital activities and to raise the power of propagation. The *proportion* between Individuation and Genesis remains the same: both are increased by the increase of the common stock of materials.

370. The conformity of human fertility to the laws of multiplication in general, being granted, it remains to inquire what effects must be caused by permanent changes in the natures and circumstances of men.

XIII. HUMAN POPULATION IN THE FUTURE.

371. Any further evolution in the most highly-evolved of terrestrial beings, Man, must be of the same nature as evolution in general. It must be an advance towards completion of that continuous adjustment of internal to external relations which, in Chapter III., was shown to constitute Life.

372. Looking at the several possibilities, and asking what direction this further evolution, this more complete moving equilibrium, this better adjustment of inner to outer relations, this more perfect co-ordination of actions, is likely to take; the conclusion is that it must take mainly the direction of a higher intellectual and emotional development. There is abundant scope for development in ascertaining the conditions of existence to which we must conform; and in acquiring a greater power of self-regulation.

373. What are those changes in the environment to which, by direct or indirect equilibration, the human organism has been adjusting itself, is adjusting itself now, and will continue to adjust itself? And how do they necessitate a higher evolution of the organism? In all cases, pressure of population is the original cause. Were it not for the competition this entails, so much thought and energy would not daily be spent on the business of life; and growth of mental power would not take place. Difficulty in getting a living is alike the incentive to a higher education of children, and to a more intense and long-continued application in adults. Nothing but necessity could make men submit to this discipline; and nothing but this discipline could produce a continued progression.

374. Excess of fertility is, then, the cause of Man's further evolution. And the obvious corollary is, that Man's further evolution itself necessitates a decline in his fertility. The future progress of civilization will be accompanied by an enhanced cost of Individuation: whether it be in greater growth of the organs which subserve self-maintenance, in their added complexity of structure, or in their higher activity, the abstraction of the required materials, implies a diminished reserve of materials for race-maintenance. This greater emotional and intellectual development does not necessarily mean a mentally laborious life, for, as it gradually becomes organic, it will become spontaneous and pleasurable.

375. The necessary antagonism of Individuation and Genesis, not only fulfils the *a priori* law of maintenance of

race, from the Monad up to Man, but ensures final attainment of the highest form of this maintenance—a form in which the amount of life shall be the greatest possible, and the births and deaths the fewest possible. From the beginning, pressure of population has been the proximate cause of progress. After having duly stocked the globe with inhabitants; raised all its habitable parts into the highest state of culture; brought all processes for the satisfaction of human wants to perfection; developed the intellect into complete competency for its work; and the feelings into complete fitness for social life; the pressure of population, as it gradually finishes its work, must gradually bring itself to an end.

376. Changes numerical, social, organic, must, by their mutual influences, work unceasingly towards a state of harmony—a state in which each of the factors is just equal to its work. And this highest conceivable result must be wrought out by that same universal process which the simplest inorganic action illustrates.

PART III.

"THE PRINCIPLES OF PSYCHOLOGY."

CHAPTER IX.

THE DATA OF PSYCHOLOGY.

"Treating of the general connexions of Mind and Life and their relations to other modes of the Unknowable."

I. THE NERVOUS SYSTEM.

1. The inferior animals must be contemplated as being generators of very small quantities of actual or potential motion, and the higher animals as being generators of relatively immense quantities.

2. With what internal differences are these differences of external manifestation connected? While the genesis of motion is remotely dependent on digestive, vascular, respiratory, and other structures, and is immediately dependent on contractile structures: the initiator, or primary generator, of motion is the Nervous System. A few typical contrasts will show that the quantity of motion produced is related to the degree of nervous development.

3. In the *Mollusca*, while the sedentary Ascidians possess but a single ganglion with its fibres, the active Cephalopods have much larger masses of nerve tissue. In the *Annulosa*, the caterpillar has but a small nervous system, the butterfly a relatively large one. In the *Vertebrata*, the most striking evidence meets us, the average ratio of the brain to the body being roughly—in fishes, 1 to 5,668; in reptiles, 1 to 1,321; in birds, 1 to 212; and in mammals, 1 to 186. The two latter being characterized by displaying much the greatest amounts of motion.

4. Though the nervous system is the initiator of motion,

and though there is evidently some relation between degree of nervous development and degree of motor energy; yet facts show that this relation is involved with, and obscured by, another.

5. The motions of inferior creatures differ from those of superior creatures in relative simplicity. The relative largeness of the human nervous system stands clearly related to the relatively enormous complexity of human actions—a complexity shown partly in the more compound simultaneous movements, but mainly in the combination of successive movements, simple and compound, directed to remote ends.

6. A further qualification must be named. A greater rate of molecular change enables a smaller nervous system to generate an amount of motion equal to a larger one. The higher blood-heat of Birds places their relatively smaller nervous system on a par with that of mammals.

7. The reasons for first looking at psychological phenomena from this apparently strange physiological point of view, and for disclosing the universality of the relation between the degree of nervous evolution and the quantity and heterogeneity of the produced motion, is, that we are primarily concerned with psychological phenomena as phenomena of Evolution; as incidents in the continuous redistribution of matter and motion.

II. THE STRUCTURE OF THE NERVOUS SYSTEM.

8. A cursory survey of the nervous system, under the various forms it presents throughout the animal kingdom, suffices to show how its evolution conforms to the laws of evolution in general. It also shows that while the rudimentary nervous system, consisting of a few threads and minute centres, is very much scattered, its increase of relative size and increase of complexity, go hand in hand with increased concentration, and increased multiplicity and variety of connexions. Carrying with us this general con-

ception, we may now study the structure of the nervous system; considering, at first, not any particular forms of it but its universal form.

9. The nervous system is composed of two tissues, which both differ considerably from those composing the rest of the organism. They are usually distinguished from one another by their colours as grey and white, and by their minute structures as vesicular and fibrous. The evidences, direct and indirect, justify the conclusion that the nervous system consists of one kind of matter under different forms and conditions. In the grey tissue this matter exists in masses containing corpuscles, which are soft and have granules dispersed through them, and which, besides being thus unstably composed, are placed so as to be liable to disturbance in the greatest possible degree. In the white tissue this matter is collected together in extremely slender threads, that are denser, that are uniform in texture, and that are shielded in an unusual manner from disturbing forces, except at their two extremities. The implication on which we henceforth proceed is, that the unstably constituted and conditioned masses are seats of destructive molecular changes, and disengagement of motion; while the stably constituted and conditioned threads, are the seats of molecular changes that are not destructive, and are probably isomeric.

10. In what way are these elements of the nervous system put together? Suppose that the skin and the receptive areas of the special senses, are marked all over with a network of irregularly-sized meshes. That the large meshes are marked out by broad lines, say a quarter of an inch, and the smaller by narrower ones. That in each of these areas exists a plexus of fibres, formed of the essential nerve substance, that are continuous with one another, but insulated from the fibres of adjacent areas; the breadth of the lines representing the extent the fibres overlap. That the insulated axis-cylinder—the afferent nerve—runs from the plexus into a vesicular mass of grey matter, or nerve

ganglion; from which again branches out to the same part another fibre, the efferent-nerve, whose ramifications end in a muscle or gland. These are the elements of a nervous arc. The unit of the nervous system is formed when a *centripetal* fibre connecting each such arc is added.

11. Such units are variously grouped and combined. Each local ganglion is a place where many afferent and many efferent nerves are connected by many portions of the unstable nerve-matter, capable of suddenly giving out much molecular motion. Each superior ganglion is a place where centripetal and centrifugal fibres from such local or inferior ganglia, are similarly connected by similar matter. And so with still higher ganglia in their relations to these. From which principle of combination it results that the possibilities of different compound relations increase as fast as the centralization progresses.

12. The establishment of more numerous, more involved, and more varied relations among the parts of the organism, implies not simply this grouping of fibres and this arrangement of centres; but also a multiplication of the nerve corpuscles, or portions of grey matter, occupying their centres. Where the compound relations formed are among many points, or where the points are to be combined in many orders, or both, great accumulations of grey matter are needed: an important corollary being that the quantity of this matter capable of giving out much motion, increases in proportion as the combinations formed become large and heterogeneous.

13. Passing to the human nervous system, sundry appliances are found for concentrating the actions of external agents on the ends of the nerves; as the lenses of the eye, and the otolites of the ear. The peripheral nerve expansions themselves here consisting of unprotected nerve-protoplasm, and containing in addition deposits of a specially unstable nerve substance, ready to change, and ready to give out molecular motion in changing. Where the forces are relatively considerable this deposit is absent.

14. From these peripheral structures, the afferent nerves run inwards to the spinal cord; out of which issue again the corresponding efferent nerves. The spinal cord is a series of partly dependent, partly independent, double nerve-centres; each concerned with a particular portion of the body. Its enlarged extremity, the *medulla oblongata*, connected with these partially-differentiated inferior centres; and receiving, as it also does, nerves from the special sense-organs, is a centre where the local centres concerned with nearly all parts of the body, are brought into communication. The *cerebrum* and *cerebellum*, overlying the *medulla oblongata*, may be regarded as centres in which these compound connexions are united into connexions still more compound, still more various, and still more numerous.

15. The brain and spinal cord, which through their afferent nerves are put in relation with the actions of the external world, and which through their efferent nerves are put in relation with the structures that react on the external world, are also, by the vaso-motor and sympathetic systems, put in relation with the organs of nutrition and excretion.

16. Many conspicuous traits of nervous structure which some will think ought here to be set down, are really altogether irrelevant. Knowledge of the truth that the posterior roots of the spinal nerves are afferent, while the anterior are efferent, is all important to the pathologist; but to the psychologist it is quite unimportant, since this arrangement might have been reversed without the principles of nervous structure being in the least changed; and it is with these principles only that the psychologist is concerned.

III. THE FUNCTIONS OF THE NERVOUS SYSTEM.

17. Here the initial inquiry must be, how the nervous system serves as at once the agent by which motions are liberated, and the agent by which motions are co-ordinated. We have to interpret its passive function as a receiver

of disturbances that set it going; its active function as a liberator of motion; and its active function as a distributor or apportioner of the motion liberated.

18. Treating of nerve-actions physiologically, and formulating them in terms of motion, we shall be considerably helped by thinking of the afferent nerves as *recipio-motor*; the efferent nerves, as *dirigo-motor;* and the nervous centres as composed of *libero-motor* elements along with elements that perform both the other functions.

19. In its primordial undifferentiated state, nerve-matter unites the properties of giving out molecular motion and conveying molecular motion; but with the advance of evolution, it becomes specialized into two kinds, of which the one, collected together in masses, has mainly the function of giving out motion, though it can still to some extent conduct it; while the other, collected together in threads, has mainly the function of conducting motion, though it can still to some extent give it out.

20. The co-operation of these two substances is seen in its simplest form in the unit of composition of the nervous system. An afferent nerve, changed by a touch at its outer end, communicates a wave of isomeric transformation to the vesicle at its inner end. This molecular disturbance, immensely increased by the decomposition set up in this unstable matter, takes the shape of a relatively powerful isomeric wave along the efferent nerve, which, being distributed among the fibres of a muscle, sets up an isomeric transformation of another kind, resulting in contraction (*Biology*, § 303).

21. On remembering the compounding and re-compounding of nerves and ganglia, we can understand how the slightest impression on a *recipio-motor* nerve, may evoke from the *libero-motor* centres an amount of force, which, discharged along the *dirigo-motor* nerves, may generate violent muscular contractions. So that, to take a case, a slight sound may produce a convulsive start of the whole body.

22. The nervous functions of human beings may now be

dealt with. On leaving out such fibres as pass through the spinal cord to and from the encephalon, and also those which connect its various parts with the encephalon, the partly dependent and partly independent centres composing the spinal cord, may be regarded as being co-ordinators of the actions performed by the skin and muscles of the trunk and limbs. The spinal cord may be looked upon as a centre of relatively simple co-ordinations. The co-ordinations of the *medulla oblongata* are compound in comparison with those of the spinal cord. Compound, because the impressions which afferent and centripetal nerves bring to it, are not only more numerous but also more heterogeneous; compound, because the impulses which it sends out are also more numerous and more heterogeneous; and compound, because it brings more involved acts into correspondence with more involved stimuli. The *cerebrum* and *cerebellum* may be regarded as organs of doubly-compound co-ordination. They are organs which have for their common function, the re-combining into larger groups, and into countless different orders, the already complex impressions received by the *medulla oblongata;* and of so arranging the already complex motor impulses issuing from the *medulla oblongata,* as to form those far more involved aggregate actions, which achieve remote ends. What are the respective parts played by these two great organs in this doubly-compound co-ordination? It appears probable that the *cerebellum* is an organ of doubly-compound co-ordination in *space;* while the *cerebrum* is an organ of doubly-compound co-ordination in *time.* The unusually-developed *cerebellum* in birds of prey; and, conversely, the unusually-developed *cerebrum* in human beings, apparently imply this.

23. When it is seen how the vaso-motor nerves regulate the blood-vessels, it is easy to conceive that through other systems of nerves, other organs which absorb, secrete, excrete, &c., are similarly controlled, and to understand, sufficiently for our present purposes, how demand for materials and supply of materials are harmonized.

24. Only in these terms of motion can there be given an adequate definition of fully-developed nervous functions. To admit any subjective element, would cause our definition to become inapplicable to all those nervous actions which have no subjective accompaniments—which go on without feelings. The definition of nervous functions as consisting in the conveyance and multiplication of molecular motions, holds in all cases. The subdivision into *recipio-motor*, *libero-motor*, and *dirigo-motor* functions gives greater comprehensiveness than any other. This progress from co-ordinations that are small and simple to those that are larger, compound, and doubly-compound, is one of the best instances of that progressive integration of motions, simultaneously becoming more heterogeneous and more definite, which characterizes Evolution under all its forms. (*First Principles*, § 142.)

IV. THE CONDITIONS ESSENTIAL TO NERVOUS ACTION.

25. Continuity of nerve-substance is an essential condition to nervous action. There must be not merely continuity of unbroken contact, but continuity of molecular cohesion.

26. The external pressure must be within certain limits. A ligature round a nerve prevents a disturbance set up at one end of it from producing any effect at the other. That pressure on the centrally-seated tracts of fibres, hinders or arrests their actions, is shown in every case of paralysis. The like is true of nerve-centres as wholes. Conversely, nerve disturbances pass with undue facility if the pressure is deficient.

27. The heat must be above a certain level. When active creatures, capable under ordinary conditions of generating enough heat within themselves, are exposed to conditions under which they lose heat faster than they make it, their nervous actions decrease, and they eventually cease to move.

28. That nerves and nerve-centres act only so long as

they are furnished with those materials which the blood-vessels bring them, is a familiar truth. The quantity of blood present in any part, and the rapidity with which fresh blood is propelled to it, both affect the degree of nervous activity in the part.

29. Nervous action depends also on the quality of the blood supplied—the proportion of the needful elements contained in it.

30. The compounds resulting from decomposition of the tissues, the nervous tissue included, must be present in but small proportions.

31. All these pre-requisites to nervous action obviously admit of being grouped as pre-requisites to the genesis, and to the conveyance, of molecular motion. These conditions conform to the hypothesis that the disturbance transmitted is an isomeric wave. It should be pointed out that these many conditions essential to nervous action, are never all fulfilled at one time in the same degree, but are usually fulfilled in various degrees and combinations; and that by now conspiring and now conflicting, they produce results that are complicated and often perplexing. This entanglement of the conditions must be borne in mind and allowed for in each case.

V. NERVOUS STIMULATION AND NERVOUS DISCHARGE.

32. Every agent, whether mechanical, chemical, thermal, or electrical, capable of altering the molecular state of a nerve, causes the nerve to produce the particular change which it habitually produces. A fact in harmony with the hypothesis of isomeric change.

33. Nerve is not capable of continuous stimulation or continuous discharge. Persistent action of whatever kind on a nerve termination or the cut end of a nerve, does not produce a persistent effect on the connected nerve-centre, or connected peripheral organ.

34. The transmission of a disturbance through a nerve

takes an appreciable time. It varies with the constitution from 28 to 32 yards per second.

35. Allied with this fact, is the one that the effect produced at the centre or at the periphery lasts an appreciable time. Muscular contraction being continuous, though the stimulus is intermittent, shows this.

36. Every excitation of a nerve-centre, other things remaining the same, reduces for a time its impressibility and its energy. When caused by moderate action, the temporary enfeeblement is inconspicuous. But if the stimulation and consequent discharge are violent, or repeated very rapidly, then repair falls so far in arrear of waste that partial or entire incapacity of the nerve-centre results. Irregularities in the manifestation of this truth, are due to the entanglement of the conditions.

37. Were Life uniform in its rate, repair and waste of all organs, including nervous organs, would have to keep an approximately even pace one with the other. But the alternation of day and night entails an alternation of greater and less facility for actions; and there has resulted in organisms an adapted alternation in the relative rates of waste and repair. The adaptation is manifestly due to survival of the fittest. An animal so constituted that waste and repair were balanced from moment to moment throughout the twenty-four hours, would, other things being equal, be overcome by an enemy or competitor that could evolve greater energy during the hours when light facilitates action, at the expense of being less energetic during the hours of darkness and concealment. Hence that rhythmical variation in nervous activity, which we see in sleep and waking, has necessarily established itself.

38. As implied by much that has gone before, nervous stimulation and nervous discharge have always both special and general effects. Beyond the primary and definite effect wrought on a particular part by a particular impression, there are in every case secondary and indirect effects diffused through the whole nervous system, and by it through the body at large.

39. Since such reflected and re-reflected disturbances everywhere act as stimuli, the entire nervous system must be regarded as at all times discharging itself. Rightly to conceive nervous action, the conspicuous emissions of force from parts of the nervous system that are strongly disturbed, must be thought of as standing out from a vague background of inconspicuous emissions from the whole nervous system, which is slightly disturbed.

40. That these pulses of molecular motion are analogous to the pulses of the blood, is shown in their being perpetually generated and diffused throughout the body; in the centripetal waves being comparatively feeble while the centrifugal are comparatively strong; and lastly, in the performance of its office by every part of the body just as much depending on the local gushes of nervous energy, as on the local gushes of blood.

VI. ÆSTHO-PHYSIOLOGY;
OR, THE LINK BETWEEN PHYSICAL AND PSYCHICAL SCIENCE.

41. Here we turn to a totally distinct aspect of our subject. We have to treat of nervous phenomena as phenomena of consciousness. The changes which, regarded as modes of the *Non-Ego*, have been expressed in the foregoing divisions in terms of motion, have now, regarded as modes of the *Ego*, to be expressed in terms of feeling. Accepting the belief, alike popular and scientific, that all the human beings known objectively have feelings like those which each knows subjectively; and the belief—remotely inferential—that feelings are the concomitants of nervous changes; the relation between feelings and nervous changes has now to be considered under its leading aspects.

42. The circumstances conducive to the one are identical with the circumstances conducive to the other. The conditions essential to the production of nervous action are essential to the production of feeling. Ability to feel depends on the continuity of nerve-fibre between periphery

and centre; on the maintenance of the pressure and temperature within certain limits; and upon the quantity and quality of the blood supply.

43. That certain nervous changes which have subjective sides early in life cease to have them later in life; that there are all gradations between wholly conscious and wholly unconscious nervous actions; and that, in adult life, a nervous action may, or may not, have an identifiable subjective aspect, as it is strong or weak; follows from the inference that feelings are the subjective sides of such nervous changes only, as are brought to the general centre of nervous connexions. The gush of molecular motion liberated from an imperfectly organized ganglion of early life not having adequate channels of escape in the commissural and efferent fibres, will partly pass to a higher centre, and so awaken a feeling. As fast as the local connexions of fibres and cells become complete, the gush of molecular motion will be able to escape along them without passing to the higher centre, and thus automatic action, without feeling, may arise.

44. A subjective state becomes recognizable as such, only when it has an appreciable duration: it must fill some space in the series of states, otherwise it is not known as present.

45. The fact that each feeling lasts an appreciable time, introduces us to the allied fact that each feeling produces a greater or less incapacity for a similar feeling, which also lasts an appreciable time. This, too, is the subjective side of a phenomenon before noticed under its objective side, (*Psychology*, § 36). For as the duration of a feeling answers to the duration of the molecular disintegration in a disturbed nerve centre, so the subsequent interval of diminished ability to feel, answers to the interval during which the disintegrated nerve centre is re-integrating itself. Among sensations of all kinds conformity to this law may be traced. After carrying a very heavy body in the hand for some time, a small body held in the same hand appears to have lost its weight; showing that the nerve centre which is the seat of sensation has been, for the moment, rendered

obtuse. Again, after eating honey, slightly sweetened things seem to have no sweetness. Other things being equal, this decrease in susceptibility to a feeling of any kind, is small or great according to the great or small constitutional vigour.

46. We come now to the concomitance of sentient states and *dirigo-motor* acts. Certain inferior *dirigo-motor* acts are unconscious; but omitting these, the law is that with each muscular contraction there goes a sensation more or less definite; a sensation directly produced, either by the discharge itself, or by the state of the muscle or muscles excited.

47. Are these correlations between nervous actions and the concomitant feelings quantitative? The quantitative correlation holds true only within narrow limits. There is good reason to conclude that at the particular place in a superior nervous centre where, in some mysterious way, an objective change or nervous action causes a subjective change or feeling, there exists a quantitative equivalence between the two: the amount of sensation is proportionate to the amount of molecular transformation that takes place in the vesicular substance affected. But there is no fixed, or even approximate, quantitative relation between this amount of molecular transformation in the sentient centre, and the peripheral disturbance originally causing it, or the disturbance of the motor apparatus which it may eventually cause.

48. The emotions conform to the same general laws as do the sensations. They vary with the quantity and quality of the blood. They last an appreciable time: indeed, persistence is relatively conspicuous. They leave behind a temporary incapacity, which is longer than that left by the sensations. They have daily rises and falls of strength, consequent on the periodicities of waste and repair. And finally, they have general as well as special discharges: in fact, the former are the more conspicuous of the two.

49. What is then the nature, from our present standpoint, of the difference between the vivid form of every feeling which is called an actual feeling, and the faint form of it

which is called an ideal feeling? It is that the vivid states of consciousness accompany direct, and therefore strong, excitations of nerve centres; while the faint states of consciousness accompany indirect, and therefore weak, excitations of the same nerve centres.

50. *Desires* are ideal feelings that arise when the real feelings to which they correspond have not been experienced for some time. They are then liable to be excited by various of the indirect disturbances reflected from part to part of the nervous system. They are usually vivid and persistent in proportion to the previous period of rest: in proportion, that is, as repair in the nerve centre has gone on unhindered by appreciable waste.

51. Thus, impossible as it is to get immediate proof that feeling and nervous action are the inner and outer faces of the same change, yet the hypothesis that they are so harmonizes with all the observed facts. And, as elsewhere shown (*First Principles*, § 40), no other verification is possible for us than that which results from the establishment of complete congruity among our experiences.

VII. THE SCOPE OF PSYCHOLOGY.

52. Thus far we have been occupied with the data of Psychology, and not with Psychology properly so-called. Here, leaving the foundations, we pass to the superstructure. Let us first distinguish between the truths which are strictly psychological, and those which merely enter into the composition of psychological truths.

53. That which distinguishes Psychology from the sciences on which it rests, is, that each of its propositions takes account both of the connected internal phenomena and of the connected external phenomena to which they refer. It is not the connexion between the internal phenomena, nor is it the connexion between the external phenomena; but it is *the connexion between these two connexions*. Suppose that A and B are two related manifestations in the environment—say, the colour and taste of a fruit;

and that *a* and *b* are the sensations produced by the peculiar light which the fruit reflects, and by the chemical action of its juice on the palate. Then Psychology is exclusively concerned with this connexion between (A B) and (*a b*). It has to investigate its nature, its origin, its meaning, &c.

54. It is contended by some that Psychology is a part of Biology, and should be merged in it. The propositions of Biology, however, when they imply the environment at all, imply almost exclusively its few general and constant phenomena, which, because of their generality and constancy, may be left out of consideration; whereas the propositions of Psychology refer to its multitudinous, special, and ever-varying phenomena, which, because of their speciality and changeability, cannot be left out of consideration.

55. The admission that Psychology is not demarcated from Biology by a sharp line, will perhaps be construed into the admission that it cannot rightly be regarded as a distinct science. But those who so construe the admission, misconceive the natures of the relations among the sciences. They assume that there exist objectively those clear separations which the needs of classification lead us to make subjectively. Whereas the fact is, that beyond the divisions between the three fundamental orders of the sciences, Abstract, Abstract-concrete, and Concrete, there exist objectively no clear separations at all: there are only different groups of phenomena broadly contrasted but shading off one into another. To those who accept the doctrine of Evolution this scarcely needs saying.

56. It remains to add that, under its subjective aspect, Psychology is a totally unique science, independent of, and antithetically opposed to, all other sciences whatever. The thoughts and feelings which constitute a consciousness, and are absolutely inaccessible to any but the possessor of that consciousness, form an existence that has no place among the existences with which the rest of the sciences deal.

57. So understanding its scope, the study of Psychology proper may now be entered upon.

CHAPTER X.

THE INDUCTIONS OF PSYCHOLOGY.

"A digest of such generalizations respecting mental phenomena as have already been empirically established."

I. THE SUBSTANCE OF MIND.

58. "Substance of Mind" may mean Mind as qualitatively differentiated in each portion that is separable by introspection but seems homogeneous and undecomposable, or, the underlying something of which these distinguishable portions are formed, or of which they are modifications.

59. Taking the latter proposition, nothing is, or can be, known of the substance of Mind. For the smallest degree of conceivable knowledge implies at least two things between which some community is recognized. Thus, to know the substance of Mind is to be conscious of some community between it and some other substance. Which is impossible. It must equally remain unknowable if, with the Idealist, we say that there exists no other substance; or, if we hold with the Realist that Being is fundamentally divisible into that which is present to us as Mind, and that which, lying outside of it, is not Mind.

60. Let us now turn to that partial knowledge of the particular states of mind, as qualitatively characterized, which lies within our possible grasp. Although the individual sensations and emotions, real or ideal, of which consciousness is built up, appear to be severally simple, homogeneous, unanalyzable, or of inscrutable natures, yet they are not so. There is at least one kind of feeling, musical sound, which

is clearly resolvable into simpler feelings. For when equal blows or taps are made one after another at a rate exceeding sixteen per second, we have a state of consciousness called a tone; but decrease the rapidity of vibration and each tap is perceived as a separate noise. The different sensations known as sounds are thus built up out of a common unit—*a nervous shock*—which must be assumed to be of very slight intensity. It is probable that all the unlikenesses among our feelings result from unlike modes of integration of this ultimate unit. It has been shown (*Psychology*, § 33) that the so-called nerve-current is intermittent—consists of waves which follow one another from the place where the disturbance arises to the place where its effect is felt. Hence, in concluding that the subjective effect or feeling, is composed of rapidly recurring mental shocks, we simply conclude that it corresponds with the objective cause—the rapidly-recurring shocks of molecular change.

61. Seeing that all the forms of Matter, apparently so diverse in Nature, may be produced by unlike arrangements of like units; we shall the better conceive the possibility that the multitudinous forms of Mind known as different feelings, may be composed of simpler units of feeling, and even of units fundamentally of one kind.

62. The foregoing reasoning, however, brings us no nearer to a solution of the final question. Since, could Mind be proved to consist of homogeneous units of feeling—or indeed could we decompose Matter into its ultimate units—the ultimate units must, in either case, remain absolutely unknown. For we are left with nothing but this simplest form as the term out of which to frame thought; and thought cannot be framed out of one term only.

63. Here, indeed, is the barrier which needs to be perpetually pointed out. The expression "Substance of Mind," if we use it in any other way than as the x of our equation, inevitably betrays us into errors; for we cannot think of substance save in terms that imply material properties. Our only course is constantly to recognize our symbols as

symbols only; and to rest content with that duality of them which our constitution necessitates. The conditioned form under which Being is presented in the Subject, cannot, any more than the conditioned form under which Being is presented in the Object, be the Unconditioned Being common to the two.

II. THE COMPOSITION OF MIND.

64. Accepting as really simple those constituents of Mind which are not decomposable by introspection, we have to consider what are their fundamental distinctive characters, and the essential principles of arrangement among them.

65. The proximate components of Mind are of two broadly-contrasted kinds: *Feelings* and the *Relations between Feelings* (commonly called Cognitions). Each feeling is any portion of consciousness which has a perceivable individuality; which is qualitatively contrasted with adjacent portions of consciousness; and which, when introspectively contemplated, appears to be homogeneous. A relation between feelings is, on the contrary, characterized by occupying no appreciable part of consciousness. Take away the terms it unites, and it disappears along with them; having no independent place—no individuality of its own.

66. Simple feelings may be divided into the centrally-initiated, or Emotions; and the peripherally-initiated, or Sensations. Sensations may be grouped into the epi-peripheral and the ento-peripheral, according as they arise on the exterior, or in the interior of the body. In contrast with this class of primary or real feelings, thus divided and subdivided, has to be set the complementary class of secondary or ideal feelings, similarly divided and subdivided.

67. In default of an ultimate analysis, which cannot be made at present, simple relations between feelings may be fundamentally divided into relations of coexistence, and into relations of sequence.

68. Tracts of consciousness formed of feelings that are centrally initiated, are widely unlike those formed of feelings

that are peripherally initiated; and of the tracts of consciousness formed of peripherally-initiated feelings, those parts occupied by feelings that take their rise in the interior of the body are widely unlike those parts occupied by feelings that take their rise on the exterior of the body. The marked unlikenesses are in both cases due to the greater or smaller proportions of the relational elements that are present. Whereas among centrally-initiated feelings, the mutual limitations, both simultaneous and successive, are vague and far between; and whereas among peripherally-initiated feelings caused by internal disturbances, some are extremely indefinite, and few or none definite in a high degree; feelings caused by external disturbances are mostly related quite clearly, alike by coexistence and sequence, and among the highest of them the mutual limitations in space or time or both, are extremely sharp.

69. Further and equally-important distinctions obtain between the tracts of consciousness thus broadly contrasted; and they are similarly caused. Presence of the relational elements, seen in the mutual limitations of feelings, simultaneous and successive, is accompanied by the mutual cohesion of feelings; and absence of the relational elements, is accompanied by their incoherence. Thus, visual feelings are absolutely coherent in space and very coherent in time; while, conversely, the bond between emotions is so feeble, that each may disappear without affecting the others.

70. These tracts of consciousness are again broadly contrasted in the respect that, in the one case, the component feelings can unite into coherent and well-defined clusters, while, in the other case, they cannot so unite. The state of consciousness produced by an object seen, is composed of sharply-outlined lights, shades, and colours, and the coexistent feelings and relations entering into one of these groups form an indissoluble whole. The emotions are obviously characterized by a want of combining power.

71. In tracts of consciousness where the relational element predominates, and where the clustering of feelings is con-

sequently decided, the clusters themselves enter into relations one with another. Grouped feelings, together with the relations uniting them, are fused into wholes which combine with other such consolidated groups in definite relations. Where the relations are few and vague, nothing of the kind takes place.

72. Feelings of different orders, do not limit one another as clearly, neither do they cohere with one another as strongly, as do those of the same order. The feelings of different orders which enter into definite relations and cohere most strongly, are those among which the relational elements predominate; and there is an especial facility of combination between those feelings of different orders which are respectively held together by relations of the same order.

73. While each vivid feeling is joined to, but distinguished from, other vivid feelings, it is joined to, and identified with, faint feelings that have resulted from foregoing similar vivid feelings. Whence arise *Ideas*. An Idea, or unit of knowledge, results when a vivid feeling is assimilated to, or coheres with, one or more of the faint feelings left by such vivid feelings previously experienced. Knowing each feeling as such or such, is our name for its becoming fused with the whole series of others like itself that have gone before. Clusters of feelings are similarly segregated. As with feelings, so is it with relations between feelings.

74. The chief purpose of this division is to show that the method of composition remains the same throughout the entire fabric of Mind. The method by which simple sensations, and the relations among them, are compounded into states of definite consciousness, is essentially analogous to the method by which primitive units of feeling are compounded into sensations. And so on in the higher stages. Knowledge of the powers and habits of things, is constituted by assimilating the relations exhibited by their actions with other such relations. If we cannot so assimilate them, or parts of them, we have no knowledge of their actions.

75. How clearly the evolution of Mind conforms to the laws of Evolution in general, will be seen as soon as it is said. From a confused sentiency, the transition is to an ever-increasing integration of feelings with one another and with feelings of other kinds; to an ever-increasing multiformity in the aggregates of feelings produced; and to an ever-increasing distinctness of structure in such aggregates. That is to say, there goes on subjectively a change "from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity;" parallel to that redistribution of matter and motion which constitutes Evolution as objectively displayed.

76. Comparing mental composition and nervous structure, it may be said that, speaking broadly, feelings correspond to the molecular changes of which nerve-corpuscles are the seats; and relations between feelings to the molecular changes transmitted through the fibres which connect nerve-corpuscles. That the relational element of Mind is greater between allied than unallied feelings, answers to the fact that the nervous structures belonging to feelings of one order, are more intimately combined than they are with the structures of other orders. It has been shown that the development of Mind is fundamentally an increasing integration of feelings on successively higher stages, along with which there go increasing heterogeneity and definiteness; and these traits answer to traits in the evolution of the nervous system before contemplated.

III. THE RELATIVITY OF FEELINGS.

77. Having contemplated Feelings in their relation to one another as components of consciousness, we have now to contemplate the nature of the connexions between feelings, and forces existing outside the organism.

78. The general truth to be presented under its many aspects, is that though internal feeling habitually depends on external agent, yet there is no likeness between them either in kind or degree.

79. It is almost needless to say that the connexion between the outer agent and the inner feeling generated by it, depends on the structure of the species. Obviously, an odour inappreciable to man, may have a very marked effect on the consciousness of a dog.

80. Besides concluding that in no two species are the subjective effects produced by given objective actions absolutely alike, qualitatively and quantitatively, we may conclude that they are absolutely alike in no two individuals of the same species.

81. Even in the same individual, the quantity, if not the quality, of the feeling excited by an external agent constant in kind and degree, varies according to the constitutional state.

82. The kind and degree of effect depends also on the part of the organism subject to it. A whiff of ammonia coming in contact with the eyes, produces a smart; getting into the nostrils, excites the consciousness of a strong odour; being condensed on the tongue, generates an acrid taste; while ammonia applied in solution to a tender part of the skin, makes it burn, as we say.

83. The state of the part affected—its temperature, its circulation, even its freshness or fatigue—has a share in determining the relation between outer agent and inner feeling.

84. The relative motions of subject and object, modify, both qualitatively and quantitatively, the relations between incident forces and evoked feelings. In a hot bath the water seems hotter to a limb that stirs than to one that is stationary; and every bather knows how much colder running water of a given temperature feels than still water of the same temperature.

85. A given amount of feeling gives rise to an amount of molar motion which varies with the muscles used, and with the age and constitutional state of the organism.

86. The peripherally-initiated feelings that arise in internal organs, and the centrally-initiated feelings or

emotions, have also their several forms of relativity. Thus, the truth that subjective consciousness, determined as it is wholly by subjective nature, state, and circumstances, is no measure of objective existence. What we are conscious of as properties of matter, are but subjective affections produced by objective agencies that are unknown and unknowable. All the sensations produced in us by environing things are but symbols of actions out of ourselves, the nature of which we cannot even conceive.

87. This conclusion is an obvious corollary from physiological truths. It is inconceivable that any resemblance exists between the subjective effect and that objective cause which arouses it through the intermediation of changes resembling neither.

88. An all-important implication must not be overlooked. Not a step can be taken towards the truth that our states of consciousness are the only things we can know, without postulating an unknown something beyond consciousness. The only thinkable proposition is, that the active antecedent of each primary feeling exists independently of consciousness. A conclusion already twice reached, when treating of the Relativity of Knowledge, and of the Data of Philosophy.

IV. THE RELATIVITY OF RELATIONS BETWEEN FEELINGS.

89. It has now to be shown that, in like manner, the forms and degrees of relations between feelings are determined by the nature of the subject—exist, as we know them, only in consciousness, and no more resemble the connexions between outer agents than the feelings they unite resemble these outer agents.

90. What we conceive as space-relations, cannot be, either in their natures or degrees, like those connexions among external things to which they are due. They change both qualitatively and quantitatively with the structure, the size, the state, and the position, of the per-

cipient. And when we see that what is, objectively considered, the same connexion between things, may, as a space-relation in consciousness, be single or double—when we remember that, according as we are near or far off, it may be too large to be simultaneously perceived or too small to be perceived at all; it becomes impossible to suppose any identity between this objective connexion and some one of the multitudinous subjective relations answering to it.

91. Concerning compound relations of Sequence, as concerning compound relations of Coexistence, it must be said that probably they are not qualitatively like the connexions to which they answer. And that compound relations of Sequence as we conceive them, cannot be quantitatively like the connexions beyond consciousness to which they refer, is proved by the fact that they vary in their apparent lengths with the structure of the organism, with its size, with its age, with its constitutional state, with the number and vividness of the impressions it receives, and with their relative positions in consciousness. Manifestly, as no one of these variously-estimated lengths can be taken as valid rather than the others, it becomes impossible to suppose equality between an interval of time as present to consciousness and any *nexus* of things which it symbolizes.

92. Deeper than the compound relations of Coexistence and Sequence, is the compound relation of Difference; since, besides being involved in the comparisons of spaces and of times, this is involved in comparisons of the Forces manifested in Space and Time. This compound relation of Difference as we know it, is also dependent on structure, on size, and on constitutional state. And as we cannot fix any one of these relations in consciousness, rather than any other, as like the reality beyond consciousness, it must be inferred there is no likeness between any one of them and the reality beyond consciousness.

93. All relations of Coexistence and Sequence are known through relations of Difference and No-difference. Sequence

is Difference of order; Coexistence is No-difference of order. Hence we have at last to deal with the relations of Difference and No-difference. And our entire consciousness being built up of feelings which present these relations, both in themselves and in the secondary feelings constituting consciousness of their order, the whole question of the relativity of relations among feelings is reducible to the question of the relativity of the relation of Difference. The relation of Difference as present in consciousness is nothing more than a change in consciousness. It can thus in no way be akin to its source beyond consciousness.

94. It may be pointed out that all these conclusions are in harmony with those which may be directly deduced from the data supplied by Physiology to Psychology.

95. Though the relation of Difference, constituted as it is by a change in consciousness, cannot be identified with anything beyond consciousness; yet that there is something beyond consciousness to which it is due, is an inevitable conclusion; since to think otherwise is to think of change taking place without an antecedent.

V. THE REVIVABILITY OF FEELINGS.

96. When vivid forms of feelings have been experienced, how does it happen that faint forms of feelings like them, afterwards arise? The inquiry is—What determines this revivability?—What conditions are they which render the revivals more or less distinct?

97. Speaking generally, feelings are revivable in proportion as they are relational. The peripherally-initiated feelings of external origin are more representable than those of internal origin; and both of these can be represented with greater facility than the centrally-initiated feelings. A particular muscular effort cannot be represented as quickly or as clearly as a particular sound or colour. An emotion cannot be at once revived in the same way that a feeling of light or sound can.

98. The revivability of past feelings varies inversely as the vividness of present feelings. This antagonism holds to a certain degree between past and present feelings in general; but it holds to a much greater degree between past and present feelings belonging to the same order. Visual impressions of great distinctness offer a scarcely appreciable resistance to the imagination of sounds; but the sounds we are hearing tend very decidedly to keep out of consciousness other sounds of which we wish to think.

99. Other things being equal, the revivability of a feeling varies with its strength, and with the number of times it has been repeated in experience.

99 *bis*. The representation of a feeling is hindered by the presence in consciousness of other represented feelings; greatly, when the feelings are of the same order, less when of different orders.

100. Besides the psychological state, there is the physiological state influencing the revivability of feelings. When the nervous centres concerned have been worn by persistent action, the impressions received cannot be recalled as clearly as those received when the centres were unworn. A complete state of repair, an active circulation, and a blood rich in the required materials, all aid the revivability of feelings.

101. A given past feeling may, *ceteris paribus*, be brought into consciousness vividly, faintly, or not at all, according as the nervous centre concerned is or is not well repaired and well supplied with blood, when the revival takes place or is attempted.

102. Quality, as well as quantity, of blood also modifies alike the strength with which an impression is retained and the facility with which it can be recalled.

103. The correspondence of these several *a posteriori* conclusions with the *a priori* conclusions derivable from the Data of Psychology, will doubtless already have become apparent to the reader.

VI. THE REVIVABILITY OF RELATIONS BETWEEN FEELINGS.

104. The revivability of relations as dissociated, little or much, from related feelings, has here to be considered.

105. Relations in general are more revivable than feelings in general. Whether it be a compound relation of Coexistence, of Sequence, or of Difference, the relation is more distinctly representable, and more enduring in memory, than are its terms. Were it not so, complex thinking would be greatly impeded, if not prevented, by the encumbrance of materials.

106. As with feelings so with relations. The most relational are the most revivable. Relations of Coexistence have a revivability far exceeding that of all other relations. Relations of Sequence, less relational, are less revivable. Simple relations of Difference (those between feelings) are not so revivable as relations of Difference between coexistences, or between sequences, nor as the relations of Coexistence and Sequence themselves.

107. Presented relations also hinder the representation of other relations. An antagonism that is more manifest between those of the same order than between those of different orders.

108. The representation of any relations is hindered by the presence in consciousness of other represented relations; the hindrance, while either great or insuperable if the two sets of relations are of the same order, is comparatively small if they are of different orders.

109. The physical conditions that are favourable to the revivability of relations between feelings are—a complete state of repair, an active circulation, and a blood rich in the required materials.

110. On comparing these subjective truths with the objective truths presented by the nervous system, a general congruity, as in other cases, may be traced.

VII. THE ASSOCIABILITY OF FEELINGS.

111. We now come to certain further truths of the phenomena of Association, about which so much has been already implied.

112. Associability and revivability go together; hence the conditions that favour revivability are those which favour associability. These, both psychological and physiological, having been enumerated in the last division, may be passed over.

113. In every simple association there are two constant elements directly presented by it—the feelings and the relations between them; and two constant elements indirectly implied by it—the previously experienced similar feelings and previously experienced similar relations. Let us first consider how the feelings, past and present, comport themselves towards one another.

114. Members of the three great groups of feelings severally associate themselves with the class, sub-class, and sub-sub-class of their own group. A law holding down to the most minute divisions of kind and quality. This is less manifestly true of the emotions than of the other feelings, for the sufficient reason that they are the least relational; while conversely, this integration is most conspicuous in the epi-peripheral, the most relational, feelings. When we look at the sky, we think of its colour as a feeling of external origin, as belonging to the feelings called visual, and to the group of these called blues: it does not suggest reds or yellows, and refuses to unite with them in consciousness.

115. This association is automatic, and constitutes the very recognition of each feeling. A feeling cannot form an element of Mind at all, except it is associated with predecessors more or less the same in nature.

116. This associability of feelings corresponds to the general arrangement of nervous structures into great divisions and sub-divisions. The association of each feeling

with predecessors identical in kind, answers to the re-excitation of the particular vesicle or vesicles which, when before excited, yielded the like feeling before experienced.

VIII. THE ASSOCIABILITY OF RELATIONS BETWEEN FEELINGS.

117. The associability and revivability of relations between feelings similarly vary together.

118. That the most relational of relations are the most associable is a truism; for the relations which enter into relation with one another most easily are the relations most easily associable with one another. The most relational of relations are those of Coexistence as visually presented; and these are associable with extreme facility. Relations of Sequence are associable into simple combinations with less facility. There is also considerable associability of coexistences with sequences.

119. Every relation, like every feeling, on being presented to consciousness, associates itself with like predecessors. Knowing a relation, as well as knowing a feeling, is the assimilation of it to past kindred exactly like it. But since within each great class the relations pass one into another insensibly, there is always, in consequence of the imperfections of our perceptions, a certain range within which the classing is doubtful—a certain cluster of relations nearly like the one perceived, which become nascent in consciousness in the act of assimilation. Along with the perceived position in Space or Time the contiguous positions arise in consciousness.

120. Hence results the so-called Law of Association by Contiguity. The fundamental law of association of relations, like the fundamental law of association of feelings, is that each, at the moment of presentation, aggregates with its like in past experience. The act of recognition and the act of association are two aspects of the same act. And the implication is that besides this law of association there

is no other; but that all further phenomena of association are incidental.

121. The congruity between this conclusion and the facts of nervous structure and function is evident.

IX. PLEASURES AND PAINS.

122. Just as the division of Feelings into real and ideal, cuts across the divisions into central and ento- and epi-peripheral; so here, the division of Feelings into pleasurable and painful, traverses all other lines of demarcation.

123. What are the states which yield Pains and what are the states which yield Pleasures? Recognizing, at the one extreme, the negative pains of inactions, called cravings, and, at the other extreme, the positive pains of excessive actions, the implication is that pleasures accompany actions lying between these extremes. Generally speaking, pleasures are the concomitants of medium activities, where the activities are of kinds liable to be in excess or in defect; and where they are of kinds not liable to be excessive, pleasure increases as the activity increases, except where the activity is either constant or involuntary.

124. That pains are the correlatives of actions injurious to the organism, while pleasures are the correlatives of actions conducive to its welfare; is an induction not based on the vital functions only. It is an inevitable deduction from the hypothesis of Evolution, that races of sentient creatures could have come into existence under no other conditions.

125. Those races of beings only can have survived in which, on the average, agreeable or desired feelings went along with activities conducive to the maintenance of life, while disagreeable and habitually-avoided feelings went along with activities directly or indirectly destructive of life; and there must ever have been, other things being equal, the most numerous and long-continued survivals

among races in which these adjustments of feelings to actions were the best, tending ever to perfect adjustment.

126. In the case of mankind, there has arisen, and must long continue, a deep and involved derangement of the natural connexions between pleasures and beneficial actions and between pains and detrimental actions. A derangement which so obscures these natural connexions that even the reverse connexions are supposed to obtain. And the half-avowed belief, very commonly to be met with, that painful actions are beneficial and pleasurable actions detrimental, has been, and still is, upheld by creeds which present for the worship of men a Being who is supposed to be displeased with them if they seek gratifications, and to be propitiated by gratuitous self-denials and even by self-tortures.

127. It is frequently taken for granted that the beneficial actions secured must be actions beneficial to the individual; whereas the only necessity is that they shall be beneficial to the race. The two are by no means identical. In fact they are diametrically opposed more frequently than not.

128. What are the intrinsic natures of Pleasures and Pains, psychologically considered? This question appears unanswerable, and may eventually prove to be so. Nevertheless, facts warrant the suspicion that while Pleasures and Pains are partly constituted of those local and conspicuous elements of feeling directly aroused by special stimuli, they are largely, if not mainly, composed of secondary elements of feeling aroused indirectly by diffused stimulation of the nervous system. Later on (*Psychology*, § 261) we may find further reasons for believing this.

CHAPTER XI.

GENERAL SYNTHESIS.

The study of Mind as objectively manifested in its ascending gradations through the various types of sentient beings.

I. LIFE AND MIND AS CORRESPONDENCE.

129. If the doctrine of Evolution is true, the inevitable implication is that Mind can be understood only by observing how Mind is evolved.

130. To obtain the widest view of this evolution, we must include the evolution nearest akin to it, that of bodily life. Our question, therefore, becomes—What is it that mental life and bodily life have in common? And this amounts to the question—What distinguishes Life in general?

131. The truth that Life is "The continuous adjustment of internal relations to external relations;" has to be developed into a combination of more special truths.

132. The reader will not fail to observe how we pass from physical to psychical vital actions the moment we rise above the correspondences that are few, simple, and immediate.

II. THE CORRESPONDENCE AS DIRECT AND HOMOGENEOUS.

133. In the least-developed organic forms, as the Yeast-plant and the *Gregarina*, the actions in the organism are immediately dependent on the affinities of the elements touching it on all sides; and the internal changes proceed uniformly, or nearly so, because, during the brief time that

the life lasts, the external relations remain uniform, or nearly so. The correspondence is at once *direct* and *homogeneous*.

134. The transition to higher forms is gradual. The ciliated animalcules and the Sponges, while they exhibit motion, do so with comparative uniformity. Water being in these cases the medium inhabited, the general fact to be observed is, that the incipient multiformity of the vital actions is in correspondence with the incipient multiformity of the environment.

III. THE CORRESPONDENCE AS DIRECT BUT HETEROGENEOUS.

135. From correspondence with a few ever-present coexistences in the environment, we pass to correspondence with a few sequences in it.

136. Life a degree higher is now seen in organisms displaying changes that correspond with the *most general* changes to which the environment is liable; and this is the kind of life exhibited by the vegetal kingdom at large.

137. Plant-animals, or zoophytes, exhibit in addition, certain special changes corresponding with special changes in the environment: the actions, for instance, which follow the touching of their expanded tentacles.

138. So far, the correspondence between internal and external relations extends only to external relations which have one or both terms in contact with the organism.

IV. THE CORRESPONDENCE AS EXTENDING IN SPACE.

139. On ascending from the lowest types of life, one marked manifestation of the heightening correspondence, is the increasing distance at which coexistences and sequences in the environment produce adapted changes in the organism. This progress accompanies the development of the senses of smell, sight, hearing, &c., and the subsequent development of the intellect.

140. As an appropriate introduction to this division, it

may be well to say, that there is reason to think that all forms of sensibility to external stimuli, are, in their nascent shapes, nothing but the modifications which those stimuli produce in that duplex process of integration and disintegration which constitutes the primordial life, physiologically considered. A zoophyte cannot be touched without the fluids diffused throughout the disturbed tissues being put in motion, and so made to supply oxygen and nutriment with greater rapidity. Nutritive matter brought in contact with the surface, which is everywhere absorbent, must excite the vital actions still more; and so must cause the touch of nutritive matter to be specially responded to. A diffusion of such matter in the form of an odour, will tend in a slight degree to produce analogous effects. The tissue having the requisite chemical nature, light, also, must modify the assimilative actions. Sonorous vibrations probably do the like. Making the reasonable assumption that the protoplasm of these almost unorganized creatures is isomerically changed by changes in their vital activity, there is an adequate explanation of the effects which outer agencies produce.

141. To trace up the evolution of the sense of smell to that perfection in which it is possessed by dogs and by deer, is to show that one of the aspects under which the advance presents itself, is the increasing distance at which certain inner and outer relations can be brought into adjustment; and to show that there is a simultaneous advance in the degree of life.

142. From organisms in which vision is but nascent, through the various types of aquatic creatures to the higher air-breathing animals, may be traced, under various forms and modifications, a complicating visual apparatus and a widening space through which the correspondence extends. One aspect of progressing life is the greater and greater remoteness at which visible relations in the environment produce adapted relations in the organism.

143. Successive improvements of the auditory faculty, as of those already dealt with, expand the surrounding sphere

throughout which certain relations in the environment cause adapted relations in the organism.

144. The extension of the correspondence in space does not end with the perfecting of the senses. Powers of adjustment, as in the carrier pigeon, arise far too remote for direct perception. Man, by combining his own perceptions with those of others as registered in maps, reaches special places lying many thousands of miles away.

145. Each further extension of the correspondence in space adds to the number of external relations to which internal relations are adjusted: adds, that is, to the number of internal changes, and adds therefore to the amount of life. The enlarged correspondence leads also to an increase in the number of cases in which food is obtained and danger shunned. Life is thus a combination of processes whose workings result in their own continuance.

V. THE CORRESPONDENCE AS EXTENDING IN TIME.

146. After the ability to respond to the touches of surrounding bodies, the next advance is the ability to respond to those motions of them which precede touch; and since motion involves both Time and Space, the first extension of the correspondence in Time is necessarily coeval with its first extension in Space.

147. Throughout the successive stages in the development of the senses, these two orders of correspondence progress together.

148. Did all actions involve perceptible motion, the two would be uniformly related. But as there are hosts of changes, chemical, thermal, electrical, vital, which occur without changes of place; it results that, in the growth of internal adjustments to these, there is an extension of the correspondence in Time separate from, and additional to, that which arises from its extension in Space.

149. This higher order of correspondence in Time, scarcely more than foreshadowed among the higher animals, and definitely exhibited only when we arrive at the human race,

has made marked progress during civilization. It is especially displayed by progressing science. Beginning with the sequences of day and night, men advanced to the monthly changes of the Moon, next to the Sun's annual cycle, next to the cycle of the Moon's eclipses, and the periods of the planets; until modern astronomy deals with scarcely conceivable epochs.

150. The extension of the correspondence in Time, like its extension in Space, involves an increased amount of life and renders possible a greater continuance of life.

VI. THE CORRESPONDENCE AS INCREASING IN SPECIALITY.

151. Otherwise considered, the evolution of life is an advance in the Speciality of the correspondence between inner and outer relations. Though at first the increase of the correspondence in Speciality is inseparable from its extension in Space and Time, yet it presently comes to include innumerable correspondences not comprehended under either of these.

152. Out of the primordial irritability which (excluding the indeterminate types that underlie both divisions of the organic world) characterizes animal organisms in general, are gradually evolved those various kinds of irritability which answer to the various attributes of matter. The fundamental attribute of matter is resistance. The fundamental sense is a faculty of responding to resistance. And while in the environment, associated with this attribute of resistance, are other attributes severally distinctive of certain classes of bodies; in the organism, there arise faculties of responding to these other attributes—faculties which enable the organism to adjust its internal relations to a greater variety of external relations—faculties, therefore, which increase the speciality of the correspondence. Throughout the animal kingdom the specialization of the senses measures the specialization of the correspondences between inner and outer relations: it is a means to this specialization.

153. When the speciality of correspondence which exhibits itself in discriminating objects from one another, is united with the speciality of correspondence which exhibits itself in discriminating *distances* in Space or Time, the previously-specialized correspondences are further specialized. And when, as during this same progress, there is developed a power of recognizing *direction* in Space, the speciality is again increased. To another set of distinctions in the environment, there is another set of adjustments in the organism.

154. Under this, as under previous aspects, an advance of the correspondence is clearly displayed in the course of human progress. In the actions guided by exact science, civilization presents us with a new and vast series of correspondences far exceeding in speciality those that came before them. For exact science is in reality quantitative prevision, as distinguished from that qualitative prevision constituting ordinary knowledge.

155. This increase in the speciality of the correspondence, like its extension in Space and Time, is both in itself a higher life, and contributes to greater length of life.

VII. THE CORRESPONDENCE AS INCREASING IN GENERALITY.

156. The advancing generality of correspondence here contemplated, shows itself in the recognition of constant coexistences and sequences other than those which characterize special classes—coexistences and sequences common to many classes that have come to be regarded as entirely unlike. This progress is seen in adjustments to relations which extend beyond class limits, and obtain under great dissimilarities.

157. The establishment of a generality of this higher kind, embracing classes superficially dissimilar, implies a power of recognizing *attributes* as distinguished from the *objects* possessing them. Necessary as it is that there should be a great advance in the speciality of the corre-

spondences to produce the requisite separation of attributes; and to bring into view the constantly-related attributes, as distinguished from the inconstantly-related ones; it is only when that developed speciality of correspondence characterizing superior creatures is reached, that progress in generality of correspondence can begin. Hence, only in the human race does this species of adjustment become conspicuous.

158. This increase of the correspondence in generality, like its other modes of increase, makes possible not only a greater duration of life; but also a higher degree of life.

VIII. THE CORRESPONDENCE AS INCREASING IN COMPLEXITY.

159. Much of the early advance in speciality does not imply advance in complexity; and the higher forms of the advance in complexity cannot without straining be comprehended under advance in speciality.

160. Wherever we find nothing but a greater ability to discriminate between varieties of the same simple phenomenon, there is increased speciality of correspondence without increased complexity. But where the stimulus responded to consists, not of a single sensation but of several, the increase in speciality of correspondence results from an increase in its complexity.

161. A further advance in speciality is achieved by a more than proportionate advance in complexity. An excess which is constituted by the addition of generalities to specialities. Each of the higher correspondences displaying rationality, implies an adjustment of inner relations not simply to the particular outer relations perceived, but to sundry general relations not then perceived, but established by previous experience.

162. This seems a fit place for drawing attention to the important fact that an approximately constant ratio is maintained between the *impressibilities* and the *activities* of the organism, in so far as their complexity is concerned. In the lowest animal types a touch is followed by a withdrawal

of the part touched: a single stimulus is followed by a single motion. Gradually, abilities to receive increasingly complicated impressions, and to perform increasingly complicated actions present themselves. And the truth here to be observed is, that the heterogeneity of the stimuli which can be appreciated is in general proportionate to the heterogeneity of the changes which can be displayed. The evolution of the sensitive or directive apparatus is inseparable from the evolution of the muscular or executive apparatus.

163. Why the sense of touch in its higher forms is, more than any other, associated with the advance of intelligence, will perhaps seem difficult to understand. The explanation lies in the fact that tactual impressions are those into which all other impressions have to be translated, before their meanings can be known. Before surrounding objects can affect the organism, or it can affect them, there must be actual contact. Only as fast as the impressions gained through the skin and muscles become varied and complex, can there be a complete translation of the varied and complex impressions gained through the eyes, ears, and nose. A simile may serve to show this. The mother tongue must be as copious as the foreign; otherwise it cannot render all the foreign meanings. Each great division of the animal kingdom, up to the highly elaborated *recipio-* and *dirigo-motor* structures and functions in man, furnishes illustrations of this connexion.

164. This interdependence of the impressibilities and activities is strikingly displayed in the course of human progress. All developed science, consisting as it does of quantitative prevision, is lineally descended from that simplest kind of measurement achieved by placing side by side the bodies held in the hands. And the undeveloped sciences that have not yet passed the stage of qualitative prevision, depending for their advance, as they do, either on experiments requiring skilful manipulation or on observations implying dissection and other analogous procedures, could

not have reached this stage in the absence of a highly-developed manual dexterity.

165. It remains to be noted, that while there has been advance in the complexity of the cognitions and operations, there has been advance in the ability to receive complex cognitions and perform complex operations. Having previously pointed out how greater length of life and higher degree of life accompany increased speciality and increased generality of correspondences, it is needless to dwell on the fact that where both these unite in producing correspondences of increased complexity, the like result must happen.

IX. THE CO-ORDINATION OF CORRESPONDENCES.

166. The performance of a compound action in response to a compound impression, implies that the constituent sensations and contractions shall be combined after a particular manner, implies that they shall be co-ordinated; and the perfection of the correspondence will vary as the perfection of the co-ordination.

167. An advance in sensory co-ordination is seen on passing from those cases in which the elements of the directive stimuli are simultaneously present to the senses, to those in which some of their elements are present to the senses and some not. And parallel progress in motor co-ordination is seen where the responding motions are divided by intervals that vary according to circumstances.

168. A still higher species of co-ordination involves not simply the union of past with present specialities, but the union of generalities with both. That in the highest manifestations of life produced by the culture of civilization, there should be an elaborate and complete co-ordination of inner relations to symbolize outer relations, serves as a crowning illustration of the truths, that Life is the maintenance of a correspondence between the organism and its environment, and that the degree of Life varies as the degree of correspondence.

X. THE INTEGRATION OF CORRESPONDENCES.

169. There has here to be noted how, out of co-ordination, there grows up integration. Compound impressions, as well as the compound motions guided by them, continually approach in their apparent characters to simple impressions and simple motions. The co-ordinated elements of any stimulus or of any act ever tend towards union; and eventually become distinguishable from one another only by analysis. Further, the connexion between stimulus and act also becomes constantly closer; so that at last they seem two sides of the same change.

170. In illustration may be named the apparent simultaneity with which the many visual sensations given us by an object, arouse those ideas of tangible extension, of resistance, of texture, with which experience has joined them; the entire group of sensations and the inferences drawn from them, seeming to constitute but a single state of consciousness. Similarly, perpetually repeated complex muscular actions, eventually approximate in rapidity and ease to simple motions: they grow inseparable, and thus become integrated. That integration which the reflex and purely instinctive correspondences perfectly exemplify, is partially exemplified by all higher correspondences.

171. The most advanced conceptions of science equally display this law. For making a generalization is, in reality, integrating the various separate cognitions which the generalization includes. It unites them into a single cognition.

172. Greater length and degree of Life, involved as they are by greater complexity and speciality of correspondence, have accompanied that greater integration which has rendered these possible.

XI. THE CORRESPONDENCES IN THEIR TOTALITY.

173. Thus, then, the connexions among vital actions directly or indirectly correspond with the connexions among

actions in the environment. The several modes in which the advance of the correspondence displays itself, are but so many different aspects of one mode. The vast array of phenomena which, for the sake of convenience, has been considered under distinct heads, forms in reality one general, continuous, and inseparable evolution. By going on simultaneously, the various orders of progress described have rendered one another possible. Every kind of advance has opened the way for advances of other kinds; and these again have re-acted in like manner. All have been furthered by each; and each has been furthered by all.

174. Every act of Intelligence being, in essence, an adjustment of inner to outer relations, it results that as, in the advance of this adjustment, the outer relations increase in number, in complexity, in heterogeneity, by degrees that cannot be marked, there can be no precise demarcations between the successive phases of Intelligence. The classifications current in our philosophies of the Mind can be but superficially true.

175. Here a new region of inquiry opens before us. Having found that all the phenomena of Psychology come within the formula which unites them with those of Physiology, we have now to see what distinguishes the one group from the other. Having presented psychological truths under their broadest aspect as biological truths; it remains to present psychological truths under their differential aspect.

176. The presentation of Intelligence as an adjustment of inner to outer relations that gradually extends in Space and Time, that becomes increasingly special and complex, and that has its elements ever more precisely co-ordinated and more completely integrated, leaves us with a conception which obviously requires further development. We must found a Special Synthesis upon this fundamental truth evolved by the General Synthesis.

CHAPTER XII.

SPECIAL SYNTHESIS.

"the Special Synthesis, after exhibiting that gradual differentiation of the psychical from the physical life which accompanies the evolution of Life in general, goes on to develop, in its application to psychical life in particular, the doctrine which the previous part sets forth: describing the nature and genesis of the different modes of Intelligence, in terms of the relation which obtains between inner and outer phenomena."

I. THE NATURE OF INTELLIGENCE.

177. The two great classes of vital actions treated of by Physiology and Psychology are broadly distinguished in this, that while the one includes both simultaneous and successive changes the other includes successive changes only. The phenomena forming the subject-matter of Physiology present themselves as an immense number of different series bound up together. Those forming the subject-matter of Psychology present themselves as but a single series. A glance at the many continuous actions constituting the life of the body at large, shows that they are going on at one time in mutual dependence. And the briefest introspection makes it clear that the actions constituting thought occur, not together, but one after another. The vital actions constituting the subject-matter of Psychology, however, never *absolutely* attain the form of a single series.

178. Continued differentiation and integration, concentrating the actions out of which psychical life is evolved, first on the surface of the organism, and afterwards on those most specialized parts of it constituting the organs of the

higher senses, necessarily render the psychical life more and more distinct from the physical life by bringing its changes more and more into serial order. We have nothing to do with the progressive development of the nervous system, and the actions that are carried on throughout its mass. These internal actions of the nervous system are initiated by the external ones to which the senses are subject. And just in proportion as the external ones tend towards the serial form, the consequent internal ones do the same.

179. This growing seriality in the psychical changes is, indeed, necessitated by advance of the correspondence. In other words, the advance of the correspondence, the development of consciousness, and the increasing tendency towards a linear order in the psychical changes, are different aspects of the same progression.

180. Though Psychical changes are not absolutely distinguished from physical changes by their seriality, yet they are relatively so distinguished; and in proportion as they assume that most developed form constituting rationality they cohere into a seemingly single succession of states. Though these states are physiologically composite, and were once psychologically composite, yet, to the extent that they have become consolidated elements of thought, they may rightly be regarded as severally simple.

181. A succession of changes being thus the subject-matter of Psychology, it is the business of Psychology to determine the law of their succession.

II. THE LAW OF INTELLIGENCE.

182. All Life, whether physical or psychical, being the combination of changes in correspondence with external coexistences and sequences, it results that if the changes constituting psychical life occur in succession, the law of their succession must be the law of their correspondence.

183. The correspondence between the internal order

and the external order—the law of intelligence—consists in this, that the *persistence* of the connexion between the states of consciousness is proportionate to the *persistence* of the connexion between the agencies to which they answer.

184. The acts of animals exhibit countless failures of the internal order to parallel the external order. In the moth which flies at a candle-flame, there exists no relation of psychical states answering to the relation between light and heat in the environment. The disappearance of such discrepancies between thoughts and facts we speak of as an advance in intelligence.

185. How does this conception include coexistences? Here it must suffice to say that the relation of coexistence is distinguished from the relation of sequence by the readiness of its terms to follow one another through consciousness in either order, with equal facility and vividness; that the consciousness of it arises when, in passing backwards and forwards from one term to the other, the sequences being similarly unresisting cancel one another; and that thus it consists of a duplication in consciousness, made up of a sequence and its inversion.

186. Rightly interpreted this law applies as fully to the fortuitous relations presented in any act of perception, as it does to the more or less habitual relations which experience establishes among ideas. For is not a fortuitous relation in the environment paralleled by a similarly fortuitous relation in thought?

187. This law of intelligence is to be taken as the law of intelligence in the abstract; not the law of our intelligence, or of any intelligence with which we are acquainted. It is the law to which psychical changes conform more and more as intelligence becomes higher; but which can be perfectly conformed to only by perfect intelligence. Only in virtue of this law can there be that adjustment of internal relations to external relations which constitutes life, while it makes possible the continuance of life.

III. THE GROWTH OF INTELLIGENCE.

188. We have next to examine the modes in which better fulfilment of this law is exhibited; and to seek the general cause for this ever increasing fulfilment of it.

189. There are two possible hypotheses as to how the various degrees of cohesion between the antecedents and consequents of psychical changes are adjusted. One, that the strength of the tendency which each state of consciousness has to follow any other, is fixed beforehand by a Creator—that there is a "pre-established harmony" between the inner and outer relations. The other, that it depends on the frequency with which the two have been connected in experience—that the outer relations produce the inner relations. Of the two hypotheses, the first is supported by no positive evidence whatever, while the second is supported by such positive evidence as we have. Hence, it cannot but be inferred that, the growth of intelligence at large depends on the law, that when any two psychical states occur in immediate succession, an effect is produced such that if the first subsequently recurs there is a certain tendency for the second to follow it.

190. By this law, if it is the true one, must be interpretable all the phenomena, from their lowest to their highest grades. Let us now contemplate the growth of Intelligence under its leading aspects.

IV. REFLEX ACTION.

191. From that lowest kind of Reflex action in which a single impression produces a single contraction, the ascent is to complications in the stimuli and in the acts resulting from them.

192. The changes of Reflex action correspond to external relations which are only one degree more specialized than the relations to which physical changes correspond. While the processes of the purely vegetative life are in

adjustment with those most general relations which pervade the environment at large; these lowest processes of the animal life are in adjustment with the most general relations of the solid bodies contained in the environment.

193. Further, it is to be noticed that in conformity with the general law of intelligence, there is, in one of these reflex actions, an established connexion between two psychical states answering to an established connexion between two external phenomena.

V. INSTINCT.

194. Instinct may be described as—compound reflex action. While in the more developed forms of reflex action a single impression is followed by a combination of contractions; in what we distinguish as Instinct, a combination of impressions is followed by a combination of contractions; and the higher the Instinct the more complex are both the directive and executive co-ordinations.

195. Instinct is obviously further removed from purely physical life than is simple reflex action. While simple reflex action is common to the internal visceral processes and to the processes of external adjustment, Instinct is not. Instincts are not displayed by the kidneys, lungs, and liver; they occur only among the actions of that nervo-muscular apparatus which is the agent of psychical life.

196. How, by accumulated experiences, can instincts be developed out of simple reflex actions? Let it be granted that the more frequently psychical states occur in a certain order, the stronger becomes their tendency to cohere in that order, until they at last become inseparable; let it be granted that this tendency is inherited, and it follows that there must eventually result an automatic connexion of nervous actions, corresponding to the external relations perpetually experienced. Similarly if, from some change in the environment of any species, its members are frequently brought in contact with a relation having terms a little

more involved; if the organization of the species is so far developed as to be impressible by these terms in close succession; then, an inner relation corresponding to this new outer relation will gradually be formed, and will in the end become organic. And so on in subsequent stages of progress.

197. The progression from the lower to the higher instincts is, throughout, a progression towards greater speciality and complexity of correspondence. The necessity of this order will be seen on remembering that complex relations, both external and internal, being composed of simple ones, must be preceded by simple ones.

198. If, as the instincts rise higher and higher, they come to include psychical changes that are less and less coherent with their fundamental ones; there must arise a time when the co-ordination is no longer perfectly regular. If these compound reflex actions, as they grow more compound, also becomes less decided; it follows that they will eventually become comparatively undecided. They will begin to lose their distinctly automatic character. That which we call Instinct must pass insensibly into something higher.

VI. MEMORY.

199. Memory cannot exist so long as the psychical changes are completely automatic. But, when, as a consequence of advancing complexity and decreasing frequency in the groups of external relations responded to, there arise groups of internal relations which are imperfectly organized and fall short of automatic regularity; then, what is called Memory becomes nascent.

200. While the absolutely-persistent relations among external attributes, are responded to by inseparable relations of psychical states; the others, in their respective grades of persistence, are responded to by psychical states proportionate in their degrees of cohesion. Hence, of the impressions produced by adjacent objects during the movements

of the organism, each is apt to make nascent certain other impressions with which it has been connected in experience —calls up ideas of such other impressions; that is, causes a remembrance of the attributes previously found in connexion with the perceived attributes. As these psychical states have in their turns been connected with others, they tend to arouse such others; and thus there arises that succession of ideas, partly regular, partly irregular, which is called Memory—regular in so far as the connexions of external phenomena are regular, and irregular in so far as the groups of those phenomena occur irregularly in the environment.

201. This truth, that Memory comes into existence when the involved connexions among psychical states render their successions imperfectly automatic, is in harmony with the obverse truth, that as fast as those connexions among psychical states which we form in Memory, grow by constant repetition automatic, they cease to be part of Memory.

202. Memory, then, pertains to that class of psychical states which are in process of being organized. It continues so long as the organizing of them continues, and disappears when the organization of them is complete.

VII. REASON.

203. That the commonly-assumed *hiatus* between Reason and Instinct has no existence, is implied both in the argument of the last few divisions, and in that more general argument elaborated in the "General Synthesis."

204. That the transition from instinctive to rational actions is gradual will be evident on calling to mind a rational action. When the confusion of a complex impression with some allied one causes a confusion among the nascent motor excitations, there is entailed a certain hesitation; until some one set—the strongest—prevails over the others and passes into action; and as this sequence will usually be the one that has recurred oftenest in experience,

the action will generally be the one best adapted to the circumstances. But an action thus produced is a rational action, and is just the process which we saw must arise whenever, from increasing complexity and decreasing frequency, the automatic adjustment of inner to outer relations becomes uncertain or hesitating. Hence, it is clear that the actions called instinctive pass gradually into the actions called rational. Further proof is furnished by the converse fact, that the actions we call rational are, by long-continued repetition, rendered automatic or instinctive.

205. At the same time there arises that kind of reasoning which does not directly lead to action—that reasoning through which the great mass of surrounding coexistences and sequences are known. As fast as the groups of external attributes and relations recognized, become too complex to be consolidated into single psychical states, there result both the opportunity and the power of inferring such attributes or relations belonging to any group, as are not immediately presented.

206. Does the experience-hypothesis furnish an adequate solution of the foregoing? It does. The genesis of instinct, the development of memory and reason out of it, and the consolidation of rational actions and inferences into instinctive ones, are alike explicable on the single principle, that the cohesion between psychical states is proportionate to the frequency with which the relation between the answering external phenomena has been repeated in experience. And so with the evolution of the higher forms of rationality out of the lower.

207. To complete the argument it would need but to show, by a special synthesis, that the establishment of every generalization, simple or complex, concrete or abstract, is definitely explicable in conformity with the principle hitherto traced. The general law that the cohesion of psychical states is determined by the frequency with which they have followed one another in experience, affords a satisfactory solution of the highest as of the lowest psychological phenomena.

208. We have now to observe that the establishment of those consolidated, those indissoluble, those instinctive mental relations constituting our ideas of Space and Time, is comprehensible on the same principle. For if to external relations that are often experienced during the life of a single organism, answering internal relations are established that become automatic; then, if there exist certain external relations which are experienced by all organisms at all instants of their waking lives—relations which are absolutely constant, absolutely universal—there will be established answering internal relations that are absolutely constant, absolutely universal. Such relations we have in those of Space and Time. Being the constant and infinitely-repeated elements of thought, they must become the automatic elements of thought. They must become the elements of thought which it is impossible to get rid of—the "forms of intuition."

VIII. THE FEELINGS.

209. If all mental phenomena are incidents of the correspondence between the organism and its environment; and if this correspondence passes insensibly from its lowest to its highest forms; then it follows, *a priori*, that no orders of Feelings can be completely disentangled from other phenomena of consciousness.

210. The impossibility of dissociating the intellectual from the emotional psychical states may be discerned in our ordinary experiences. The state of consciousness produced by a melody, or by a single beautiful tone, shows cognition and emotion inextricably entangled.

211. Feeling and intelligence, throughout all phases of their evolution, are at once antithetical and inseparable. Every sensation, to be known as one, must be perceived; and must so be in one respect a perception. Every perception must be made up of combined sensations; and must so be in one respect sensational. The implication is that

they are but different aspects of the same development, and may so be expected to arise from the same root by the same process. This being understood, the feelings may now be considered synthetically.

212. While an entire absence of Memory and Reason is accompanied by an entire absence of Feeling, the same progress which gives origin to Memory and Reason simultaneously gives origin to Feeling. The existence of Feeling implies psychical states having some persistence. But psychical states having some persistence are the states which result when automatic action fails. Thus then, as the psychical changes become too complicated to be perfectly automatic, they become incipiently sensational. Memory, Reason, and Feeling, take their rise at the same time.

213. When two very similar groups of external attributes and relations have been followed in experience by different motor changes; and when, consequently, the presentation of one of these groups partially excites two sets of motor changes, each of which is prevented by their mutual antagonism from at once taking place; then, while one of these sets of nascent motor changes and nascent impressions habitually accompanying it, constitutes a *memory* of such motor changes as before performed and impressions as before received, and while it also constitutes a *prevision* of the action appropriate to the new occasion, it further constitutes the *desire* to perform the action. For different as these three things eventually become, they are originally one.

214. The progress from these forms of feeling considerably compounded to those highly-compounded forms of feeling seen in human beings, equally harmonizes with the general principles of evolution that have been laid down. As with cognitions, so with feelings, advance from the simplest to the most complex, is explicable on the principle that the outer relations produce the inner relations.

215. One of the corollaries from the foregoing doctrines is that, other things being equal, feelings are strong in proportion as they include many actual sensations, or nascent

sensations, or both. From this corollary there is a second corollary. Other things being equal, the higher the evolution rises, the stronger do the emotions become. For as the increasingly-complex emotions successively developed, result from integration of pre-existing groups of actual and nascent sensations, the resulting totals must grow continually larger. A marked illustration of this truth is furnished by the passion which unites the sexes. This is habitually spoken of as though it were a simple feeling. Whereas it fuses into one immense aggregate most of the elementary excitations of which we are capable; whence results its irresistible power. There goes on at the same time, and as a result of the same cause, an evolution of emotions that are not only more complex, but also more abstract. Of this, the love of property supplies an example.

216. The law of development of the mental activities considered under their cognitive aspect, equally applies to them considered under their emotional aspect. That gradual organization of forms of thought which we saw results from the experience of uniform external relations, is accompanied by the organization of forms of feeling similarly resulting. That the experience-hypothesis as ordinarily understood, is inadequate to account for emotional phenomena, will be sufficiently manifest. If possible, it is even more at fault in respect to the emotions than in respect to the cognitions.

IX. THE WILL.

217. All who have followed the argument thus far, will see that the development of what is called Will, is but another aspect of the general process whose other aspects have been delineated in the last three divisions.

218. That Will comes into existence through the increasing complexity and imperfect coherence of automatic actions, is clearly implied by the converse fact, that when actions which were once incoherent and voluntary are very frequently repeated, they become coherent and involuntary.

Just as any set of psychical changes originally displaying Memory, Reason, and Feeling, cease to be conscious, rational, and emotional, as fast as by repetition they grow closely organized; so do they at the same time pass beyond the sphere of volition. Memory, Reason, Feeling, and Will, simultaneously disappear in proportion as psychical changes becomes automatic.

219. Long before reaching this point, most readers must have perceived that the doctrines developed in the last two chapters are at variance with the current tenets respecting the freedom of the Will. From the universal law that, other things being equal, the cohesion of psychical states is proportionate to the frequency with which they have followed one another in experience, it is an inevitable corollary that all actions whatever must be determined by those psychical connexions which experience has generated —either in the life of the individual, or in that general antecedent life of which the accumulated results are organized in his constitution.

220. Will is spoken of as something apart from the feeling or feelings which, for the moment, prevail over others; whereas it is nothing but the general name given to the special feeling that gains supremacy and determines action. Will is no more an existence separate from the predominant feeling, than a king is an existence separate from the man occupying the throne.

CHAPTER XIII.

PHYSICAL SYNTHESIS.

"An attempt to show the manner in which the succession of states of consciousness conforms to a certain fundamental law of nervous action that follows from the First Principles laid down at the outset."

I. A FURTHER INTERPRETATION NEEDED.

221. There has still to be answered the inquiry—How is mental evolution to be affiliated on Evolution at large, regarded as a process of physical transformation? The problem is to interpret mental evolution in terms of the redistribution of Matter and Motion.

222. Here, then, the structure and functions of the nervous system, considered as resulting from intercourse between the organism and its environment, form our subject matter. We have to identify the physical process by which an external relation that habitually affects an organism, produces in the organism an adjusted internal relation.

II. THE GENESIS OF NERVES.

223. From what has been previously said it follows that, from beginning to end, the development of nerve results from the passage of motion along the line of least resistance, and the reduction of it to a line of less and less resistance continually. The first opening of a route along which equilibrium is restored between a place where molecular motion is in excess and a place where it is in defect, comes

within this formula. The production of a more continuous line of that peculiar colloid best fitted to transmit the molecular motion, also comes within this formula; as does likewise the making of this line thicker and more even. And the formula also covers that final process by which the line, having been formed, has its molecules brought into the polar order which least resists, and indeed facilitates, the transmission of the wave.

224. Otherwise, we may say that while each passage of a wave is the establishment of an equilibrium between two places in the organism, the formation of this line of easy transmission is an approach towards equilibrium between the structural arrangements of the line and the forces to which it is exposed. While its molecules are so arranged as to offer resistance to the passing wave, they are liable to be changed in position by the wave—they are out of equilibrium with the forces they are subject to. Each approach towards an attitude of equilibrium is a change towards diminished resistance. And so on until there is simultaneously reached the state of structural equilibrium and no resistance.

225. Carrying with us these conceptions, we will now look at the genesis of nervous systems in their successive stages of evolution.

III. THE GENESIS OF SIMPLE NERVOUS SYSTEMS.

226. Where, before nerves exist, there is prompt transmission of a molecular impulse from one part of an organism to another, the conditions are such that the structure itself determines the line of transmission. This is shown in the comparatively quick withdrawal of the slender tentacles of *Hydra*, and the slow withdrawal of the mass they are seated on.

227. The most important fact to be noted in the first step of nervous development, is that the contractile tissue, which when it acts absorbs molecular motion, becomes

differentiated *before* there arise any traceable nerve-fibres conveying molecular motion from places where it has been evolved.

228. Taking the *Hydra* as an example, we may see that when a collision occurs, the tentacles being touched before the body, there will be sent a wave of molecular motion from them, part of which is absorbed in their own contraction, but a surplus of which passes on, setting up contractions of the portions below, which, being struck the instant after, and made to contract, becomes a place where the molecular motion is absorbed. From which it may be gathered that, when the channel is developed, the wave of disturbance may eventually cause the body to shrink before it receives the blow, in anticipation that is, of the blow.

229. This wave as it passes on to the considerably extended contractile colloid will tend to divide according to the respective tensions of the parts. Hence, at the place where the wave breaks up and its parts diverge, the molecules cannot so arrange themselves as to conduct with facility all parts of the wave, and some of the nerve-colloid will remain in an amorphous state; consequently, the wave of molecular motion brought here will be checked; and by as much as it is checked will tend to cause decompositions among the unarranged molecules. From which it may be seen to follow that when decomposition occurs, additional molecular motion must be disengaged. Thus there will arise something having the character of a ganglion corpuscle.

230. These physical processes become more comprehensible, on calling to mind the microscopic size of the total organism involved. The thickness of protoplasm through which these restorations of equilibrium are effected being about that of stout paper. The essence of the argument is, that to some place of greatest and most frequent contraction, lines of discharge will be formed from places habitually touched before contraction is set up.

IV. THE GENESIS OF COMPOUND NERVOUS SYSTEMS.

231. In some kinds of pigment produced in animal tissue, light produces marked molecular changes. As the rudimentary eye consists of a few pigment grains, it may be inferred that rudimentary vision is constituted by the wave of disturbance which a sudden change in the states of these pigment-grains propagates through the body.

232. As soon as the channel for the transmission of this motion becomes tolerably permeable, the molecular motion disengaged by the impression of an approaching object, may reach the muscle before the molecular motion set up by touch can reach it; and a consequent contraction of the muscle will withdraw the body in anticipation of touch: the creature will retreat as though alarmed by the approaching object.

233. In bilaterally-symmetrical locomotive creatures having two rudimentary eyes, two muscles, and nerves joining them connected through a nerve plexus, the instability of the homogeneous implies that one of these nerve-connections will become the better transmitter of motion. From which it may be seen that, as in many cases the object perceived will be food, only those individuals will survive in which the nervo-muscular connexion causes the organism to approach the object seen. Natural Selection will insure not simply the continuance of this faculty, but also its progressive development.

234. It is manifest that the advantages derivable from rudimentary eyes will increase with their evolution. The structures producing motions that are on the average advantageous will conduce to the long life of the individual; will be developed by their repeated actions during this long life; and will be bequeathed with some functionally-produced improvements to posterity.

235. Before proceeding, it should be noted that each of these adjustments of inner to outer relations which eventually becomes automatic, passes through stages in which it is

not automatic; in which the passage of the disturbance through the chief nervous centre is slow, hesitating, and irregular.

V. THE GENESIS OF DOUBLY-COMPOUND NERVOUS SYSTEMS.

236. Let us now endeavour to form some general idea of the ways in which the processes traced thus far may work out results still more involved.

237. As nervous structures become more complex and more integrated, the network of their connexions becomes so close that every special muscular excitement is accompanied by some general muscular excitement. Along with the concentrated discharge to particular muscles, the ganglionic plexuses inevitably carry off a certain diffused discharge to the muscles at large. Every passing thing, as well as every thing passed, augments the general discharge to the vital organs and muscular system at large. These are what, under their subjective aspects, are called feelings and ideas. The more extensive and intricate the central plexus grows, the more *detached* may these become from the actions—the more may the impressions produced by things and relations reverberate through the nervous system —the more may there arise trains of thought.

238. This leads us to the passing of compound co-ordination into doubly-compound co-ordination. A broad contrast exists between the two; and there are reasons, additional to those before given (*Psychology*, § 22), for assigning the function of doubly-compound co-ordination to the highest nervous centres.

239. Visual impressions and their concomitants are co-ordinated, both directly and indirectly, with muscular actions and their concomitants. The direct co-ordinations include such as are possible to a creature by changing the relative positions of its parts without changing its position in space. The indirect co-ordinations include such as are possible only by changing its position in space as well as by changing

the relative positions of its parts. For instance, without moving from the spot on which I stand, I can explore very completely all things within reach of my hands; while I cannot tactually explore the picture on the opposite wall without additional movements, varying with its direction and distance. The latter displaying co-ordinations vastly larger in number than the former; and which become increasingly numerous and complex as the remoteness increases.

240. In asking how such higher co-ordinations are evolved out of lower ones, and how the structure of the nervous system becomes progressively complicated in such way as to achieve them, the cardinal fact to be remembered is that such higher co-ordinations are effected by *intercalations* of new clustered states between the original clustered states. Hence it is to be expected that in the nervous system which achieves them, there must be intercalated plexuses of fibres and cells.

241. When we pass from the compound to the doubly-compound co-ordinations, we come to co-ordinations in Space and co-ordinations in Time uniting to achieve the entire co-ordination. Before a step is taken towards an object, the impressions made by it and all things around, stand in a plexus of relations of coexistence. Each step implies muscular and tactual sequences accompanied by numerous visual sequences; and the step ends by bringing about a modified plexus of coexistences. The two orders of relations are therefore correlatives, and serve to interpret one another. Without some means of registering the series of motions to be gone through in reaching the object, there could be no consciousness of its distance. Without consciousness of its distance, the muscular feelings gone through could have no meanings in thought as the equivalents of certain spaces traversed. The compositions of the *cerebrum* and the *cerebellum* correspond with this hypothesis.

242. It is needless to say that the actual genesis of nervous systems has been so involved that a true delineation would be scarcely comprehensible. We must not even

attach too definite a meaning to the terms used, such as "fibre" and "plexus."

VI. FUNCTIONS AS RELATED TO THESE STRUCTURES.

243. What have been considered as increasingly-complex nervous actions have now to be considered as increasingly-complex mental states.

244. The apparatus effecting the perceptions which are followed by reflex actions, is capable of effecting perceptions which are not followed by reflex actions. Clustered visual feelings yielded by inanimate bodies, are, like those yielded by animate bodies, apt to be joined in experience with clustered feelings yielded by them to the skin and muscles; and the two clusters so excited, though less frequently forming a sequence, eventually become correlated in a similar way. Thus the chaotic impressions received from environing objects, are slowly evolved into a slightly-organized consciousness of environing objects.

245. Between a perception physiologically considered and a perception psychologically considered, the relation will now become manifest. A perception can have in a nerve centre no definite localization, but only a diffused localization. No one excited fibre or cell produces consciousness of an external object: there must be a plexus of fibres and cells. And not only does this plexus of fibres and cells differ with every different object, but it differs with every different position of the same object.

246. When do Ideas, rightly so-called, arise? They arise when compound co-ordination passes into doubly-compound co-ordination. They grow distinct in proportion as the correspondence extends in Space and Time. That is to say, ideas form a larger and larger portion of consciousness as fast as there develop those two great pedunculated nerve-centres which distinguish the superior animals; ideas become more multitudinous and more separable from direct sense-impressions as these centres increase in size and

structure; and eventually, when these centres are highly evolved, ideas admit of combination into trains of thought that are quite independent of present external perceptions.

247. Respecting Emotions it has only to be added that they, like ideas, result from the co-ordinating actions of the cerebrum and cerebellum upon the *medulla oblongata* and structures it presides over. As the plexuses in these highest nervous centres, by exciting in distinct ways special sets of plexuses in the inferior centres, call up special sets of ideal feelings and relations; so, by simultaneously exciting in diffused ways the general sets of plexuses to which these special sets belong, they call up in vague forms the accompanying general sets of ideal feelings and relations—the emotional background appropriate to the definite conception. We might say that the superior nervous centres arouse reverberating echoes of all kindred chords and cadences that have been struck during an immeasurable past.

248. A few remarks are here called for respecting the tenets of the phrenologists. It scarcely needs saying that the conception above elaborated, implying the constant co-operation of all the leading nervous centres in every thought and emotion, is quite at variance with their theory, as presented by themselves. It does not imply, however, its absolute untruth. Different parts of the cerebrum must, *in some way or other*, subserve different kinds of mental action. Localization of function is the law of all organization whatever; and it would be marvellous were there here an exception. But to coincide with the doctrine of the phrenologists in its most abstract shape, is by no means to coincide with their concrete embodiments of it. However defensible may be the hypothesis of a localization of faculties, when presented under an abstract form, it is quite indefensible under the form given to it by phrenologists.

VII. PSYCHICAL LAWS AS THUS INTERPRETED.

249. We have now to compare the foregoing deductions

from a physical principle, with the inductively-established laws of mental action, and to see if the two correspond.

250. That the established laws of association are congruous with the physical principle laid down, is evident from the following facts. The connexion formed between two feelings or ideas that occur together or in succession, is strong when they are vivid, and feeble when they are faint. The repetition of the relation between two states of consciousness strengthens their union. In the process of connecting mental states, the earlier repetitions of the relation between them have greater effects than the later repetitions.

251. The laws of more complex mental changes—as the phenomena of habit considered under those involved forms in which the emotions play a leading part—are similarly interpretable.

252. Certain leading traits of developed intelligence follow from the fact that actions become less automatic as they become more complex. (*Psychology*, § 235.) As we ascend to intelligences in which highly involved impressions initiate highly-involved kinds of conduct, the automatic and instinctive adjustments bear a continually decreasing ratio to the mass of adjustments—there is an increasing proportion of actions that take place with deliberation and consciousness, as well as an increase in the amount of deliberation and degree of consciousness.

253. Similarly, with the advancing evolution of the feelings there is a diminution of fitfulness and uncertainty of conduct. An emotional nature not well developed is relatively impulsive; while with high emotional development there is little liability to sudden outbursts of feeling. The conduct eventually decided on is also more persistent.

VIII. EVIDENCE FROM NORMAL VARIATIONS.

254. How the functions of the nervous system will be affected by changes of physiological conditions; and how

the accompanying subjective states will be modified, becomes now our question. In answering which it will aid us to revert to the common hypothesis of a nervous "fluid" moving in nerve "currents." Admitting that though the molecular motion which works nervous effects is not a fluid, and its transfer not a current, they may be conveniently dealt with as though they were.

255. Take first the general variations which are seen on contrasting the mental traits of youth and age. In early life with its rapid rate of waste and repair, the channels of the nervous system are filled to overflowing; and the feelings of both orders are vivid: the sensations are distinct and the emotions lively. Contrariwise, in advanced life with its diminished rate of waste and repair, the nervous channels receive more feeble gushes of nervous fluid; and the feelings aroused are less vivid, and the relations formed between them less coherent.

256. Similarly with the general psychical variations that accompany differences of bodily constitution. The man whose nervous system works under high pressure shows an abundance of ideas. He has always something to say; and instantly finds words fit for the occasion. In the man whose nervous system works at low pressure, thoughts come slowly in single file instead of rapidly in a column formed of many almost abreast.

257. That general physical causes entail such general psychical differences, we see again on contrasting the exalted and depressed constitutional states of the same individual.

258. Another variation of constitutional state, occurring daily, presents us with a series of similar effects similarly produced. The diminution of nervous efflux which, reaching a certain point, shows itself in an increasing quietude, lapsing into sleep, is accompanied by a descending series of psychical activities conforming to the general principle set forth.

259. The psychical variations that accompany variations, not in the state of the organism as a whole, but, in the

states of its different parts, admits of a kindred solution. When muscular effort is suddenly pushed to excess, the power of thinking is appreciably diminished. That is to say, an excessive abstraction of nervous fluid diminishes so much the general pressure throughout the nervous system, that no discharges takes place along the less permeable channels.

260. More special antagonisms akin to these in their natures and effects may be traced. A very strong emotion makes such a draught on the supply of nervous fluid as to incapacitate the intellect throughout much of its higher sphere. Conceptions unconnected with the occasion, especially of kinds that are abstract and involved, become for the time impossible. There seems some reason to think that, conversely, great expenditure of energy in intense intellectual action is accompanied by a temporary diminution of emotional sensibility. Long continued intellectual absorption, unaccompanied by emotional excitement, may possibly lead to a permanent enfeeblement of the emotions.

261. How does it happen that a certain state of the circulation, or of the blood, or of both, causes in consciousness a predominance of painful ideas; while another state causes a predominance of pleasurable ideas—and this, too, in presence of the same circumstances? When the pressure throughout the nervous system is high, the less permeable lines of discharge, answering to the feebler associations among our pleasurable feelings, are filled by the escaping currents; and the aggregate of faintly aroused ideas of pleasure grows in extent as well as in strength. As the pressure augments, this diffused consciousness of pleasure bears an increasing ratio to the diffused consciousness of pain—so producing a greater sense of satisfaction. Contrariwise, as the pressure goes on diminishing, the aggregate of faintly aroused pleasurable feelings bears a decreasing ratio to the aggregate of faintly aroused painful feelings. And when the pressure has fallen so low that currents pass only along very permeable lines, it results that the diffused consciousness comes

to be composed mainly of the aggregate of faintly aroused painful feelings—so producing gloom and despair.

IX. EVIDENCE FROM ABNORMAL VARIATIONS.

262. Change of character is another trait of nervous debility. The irascibility of the chronically nervous implies a relative inactivity of the superior feelings. The plexuses of which, being extensive and intricate, and formed of the less permeable channels, are the first to fail when the nervous system is not fully charged.

263. In the temporary insanity caused by partial or general derangements of the circulation, we have further verification of the hypothesis. For where, as in nervous people, the cerebral blood vessels easily lose their contractility, and become unduly sensitive from excess of blood, as well as initiators of unduly strong disturbances, consciousness becomes a torrent of intense thoughts and feelings.

264. When such derangements of the cerebral circulation become permanent, temporary insanity passes into lasting insanity. It is not implied that vascular derangements are the only causes of insanity. An impure blood is also a more than probable cause.

265. When the pressure of nervous fluid is high, the ratio of the pleasurable to the painful elements of consciousness has been shown to be increased. Here it is to be observed that artificial happiness, as in the opium eater, is produced by artificial increase of pressure.

266. Examination of the evidence furnished by anæsthetics, shows that the changes they work, are in great measure, if not wholly, interpretable as agreeing with the general doctrine set forth.

267. The foregoing interpretations must be taken not separately, but together. The many causes of variation at work, interfere with one another in multitudinous ways and degrees—each is influenced by all, and all by each.

X. RESULTS.

268. A not unsatisfactory fulfilment of the anticipation with which we set out has now been reached. The processes of direct and indirect equilibration being postulated as acting on all organisms throughout all time, we see that, joining with them the inferred effect of every nervous discharge upon every channel passed through, there is an adequate explanation of nervous evolution, and the concomitant evolution of Mind.

269. "Thus, then, we are brought face to face with unmistakable materialism" will exclaim many a reader. But, as said before and again here repeated, the supposed implication is not the true implication.

270-2. The truth is not expressible either by Materialism or by Spiritualism, however modified and however refined. Carried to whatever extent, the inquiries of the psychologist do not reveal the ultimate nature of Mind; any more than do the inquiries of the chemist reveal the ultimate nature of Matter, or those of the physicist the ultimate nature of Motion. Though the chemist is gravitating towards the belief that there is a primitive atom, out of which by variously arranged unions are formed the so-called elements, as out of these by variously arranged unions are formed oxides, acids, and salts, and the multitudinous more complex substances; yet he knows no more than he did at first about this hypothetical atom. And similarly, though there is reason for thinking that there is a primitive unit of consciousness, that sensations of all orders are formed of such units combined in various relations, that by the compounding of these sensations and their various relations are produced perceptions and ideas, and so on up to the highest thoughts and emotions; yet this unit of consciousness remains inscrutable. Suppose it to have become quite clear that a shock in consciousness and a molecular motion, are the subjective and objective faces of the same thing; we continue utterly incapable of uniting

the two, so as to conceive that reality of which they are the opposite faces. See our predicament. We can think of Matter only in terms of Mind. We can think of Mind only in terms of Matter. When we have pushed our explorations of the first to the uttermost limit, we are referred to the second for a final answer; and when we have got the final answer of the second we are referred back to the first for an interpretation of it. We find the value of x in terms of y; then we find the value of y in terms of x; and so on we may continue for ever without coming nearer to a solution. The antithesis of subject and object, never to be transcended while consciousness lasts, renders impossible all knowledge of that Ultimate Reality in which subject and object are united.

273. And this brings us to the true conclusion implied throughout the foregoing pages—the conclusion that it is one and the same Ultimate Reality which is manifested to us subjectively and objectively. For while the nature of that which is manifested under either form proves to be inscrutable, the order of its manifestations throughout all mental phenomena proves to be the same as the order of its manifestations throughout all material phenomena.

CHAPTER XIV.

SPECIAL ANALYSIS.

"The Special Analysis has for its aim, to resolve each species of cognition into its components. Commencing with the most involved ones, it seeks by successive decompositions to reduce cognitions of every order to those of the simplest kind; and so, finally to make apparent the common nature of all thought, and disclose its ultimate constituents."

I. LIMITATION OF THE SUBJECT.

274. The Emotions not admitting of further interpretations than those which were reached synthetically, our analysis will here be limited to the phenomena classed as intellectual.

275. An analysis conducted in a systematic manner, must begin with the most complex phenomena of the series to be analyzed. After resolving them into phenomena that stand next in order of complexity, it must proceed similarly with these components; and so, by successive decompositions, must descend to the simpler and more general, reaching at last the simplest and most general. A little patience may perhaps be needed while dealing with the highly-involved operations of consciousness.

II. COMPOUND QUANTITATIVE REASONING.

276. The highest intellectual acts are those which constitute Conscious Reasoning—reasoning called conscious to distinguish it from the unconscious or automatic reasoning that forms so large an element in ordinary perception. An example of the most composite type of reasoning will be of use.

277. An engineer having constructed one tubular bridge, is required to construct another, but of double the span. Possibly it will be concluded that he has simply to double all the particulars of the previous design. But the ratio between the sustaining forces *equals* the ratio $1^2 : 2^2$. The ratio between the destroying forces—the gravitative force —*equals* the ratio $1^3 : 2^3$. And as it is seen that the ratio $1^2 : 2^2$ is unequal to the ratio $1^3 : 2^3$; it is by implication seen, that the ratio between the sustaining forces is unequal to the ratio between the destroying forces. What is the mental act by which this implication is perceived? It is manifestly not decomposable into steps. Though involving many elements, it is a single intuition; and if expressed in an abstract form amounts to the axiom—Ratios which are severally equal to certain other ratios that are unequal to each other, are themselves unequal.

278. The general truth that relations which are equal to the same relation are equal to each other, must be regarded as an axiom. Like its analogue—things that are equal to the same thing are equal to each other—it is incapable of proof. Seeing how closely, indeed, the two are allied, some may contend that the one is but a particular form of the other, and should be included under it. It is needful however to enunciate this general law in respect to relations. For whether a quantified relation be or be not rightly regarded as a thing, it is unquestionably true that in the intellectual process by which relations that are equal to the same relation are perceived to be equal to each other, the concepts dealt with are the relations, and not the objects between which the relations subsist; that the equality of these relations can be perceived only by making *them* the objects of thought; and that hence the axiom, being established by the comparison of three concepts, is established by the same species of mental act as that which has for its terms substantive things instead of relations.

279. This truth underlies important parts of geometry, and is the foundation of all mathematical analysis. Alike

in working out the simplest algebraical equation, and in performing those higher analytical processes of which algebra is the root, it is the one thing taken for granted at every step. The successive transformations of an equation are linked together by acts of thought, of which this axiom expresses the most general form. True, the assumption of it is limited to that particular case in which its necessity is so self-evident as to be almost unconsciously recognized; but it is not the less true that this assumption cannot be made without involving the axiom in its entire extent.

280. By what mental act is it known that relations which are equal to the same relations are equal to each other? The first and second relations, contemplated as equal, form together one concept; the third and second, similarly contemplated, form together another concept; and in the intuition of the equality of these concepts, the equality of the terminal relations is implied: or, to define its nature abstractedly—the axiom expresses an intuition of the equality of two relations between relations. The relations thus far dealt with have been those of magnitudes; or, in other words, *ratios*.

III. COMPOUND QUANTITATIVE REASONING—*continued.*

281. If, ceasing to consider in its totality the complex axiom—Relations which are equal to the same relation are equal to each other, we inquire what are the elements of thought into which it is proximately decomposable; we see that it twice over involves a recognition of the equality of two relations.

282. An intuition of the equality of two relations is implied in every step of quantitative reasoning—both that which deals with homogeneous magnitudes and that which deals with magnitudes not homogeneous. The demonstration of geometrical theorems exemplifies this fact. For in each step by which the special conclusion is reached, as well as in the step taken from that special conclusion to the general one, the essential operation gone through is the

establishment in consciousness of the equality of two relations. And as, in each step, the mental act is undecomposable—as for the assertion that any two such relations are equal, no reason can be assigned save that they are perceived to be so; it is manifest that the whole process of thought is thus expressed.

283. Each step in an algebraic argument is of the same nature. For unless it is perceived that a certain modification made in the form of the equation, leaves the relation between its two sides the same as before—unless it is seen that each new relation established is *equal* to the foregoing one, the reasoning is vicious.

IV. IMPERFECT AND SIMPLE QUANTITATIVE REASONING.

284. The cognition of inequality, positing nothing specific, can never be a premiss to any specific conclusion. Hence, reasoning which is *perfectly* quantitative in its results, proceeds *wholly* by the establishment of equality between relations, the members of which are either equal or one a known multiple of the other. Conversely, if any of the magnitudes standing in immediate relation are neither directly equal, nor the one equal to so many times the other, the results are *imperfectly* quantitative. A truth exemplified in those geometrical theorems asserting that some one thing is greater or less than some other; that it falls within or without some other; and the like.

285. In the case of algebraic inequations, ($x >$ or $< y$), as in the case of equations, the reasoning proceeds by steps of which each tacitly asserts the equality of the new relation to the relation previously established; with this difference, that instead of the successive relations being relations of equality, they are relations of inferiority. The general process of thought, however, is the same in both.

286. Incidentally, much has been already implied respecting simple quantitative reasoning. The steps into which every compound quantitative argument is resolvable, are

simple quantitative arguments; which involve, but again, the establishment of equality or inequality between two relations. As we see in the axiom "Things which are equal to the same thing are equal to each other." For, putting A, B, and C, as the three magnitudes, and contemplating them in pairs. We see that when A and B are united together in the single concept—a relation of equality; and when C and B are united into another such concept; it becomes impossible to recognize the equality of these two relations of equality which possess a common term, without the equality of the other terms being involved in the intuition.

287. In axioms involving four magnitudes, such as "The sums of equals are equal," the relations are not conjoined ones but disjoined ones. The compared relations have no term in common. In each case there is a certain relation, the terms of which are modified after a specified manner; and there is then an assertion that the new relation is or is not equal to the old one—an assertion which, being based on no argument, expresses an intuition.

288. The intuitions by which proportions are established, differ from the majority of the foregoing intuitions simply in their greater definiteness—in their complete quantitativeness.

V. QUANTITATIVE REASONING IN GENERAL.

289. Quantitative Reasoning involves the three ideas—coextension, coexistence, and connature; or to speak less accurately but more comprehensibly—sameness in the quantity of space occupied, sameness in the time of presentation to consciousness, and sameness in kind. It involves these either positively by asserting them, or negatively by denying them. That perfect quantitative reasoning deals exclusively with these intuitions, will be most clearly seen when it is remarked that they are the sole perfectly definite intuitions we can frame. Beyond these three orders of intuitions we have none that are perfectly definite. Our

perceptions of degree and quality in sound, colour, taste, smell; of amount in weight and heat; of relative hardness; and of relative duration; are in themselves inexact.

290. Let us glance at the successive forms which quantitative reasoning assumes, in their ascending order. The intuition underlying all quantitative reasoning is that of the equality of two magnitudes; in which are united the intuitions of coextension, coexistence, and connature in their most perfect forms. The simplest act of quantitative reasoning arises when the two intuitions are co-ordinated in a compound intuition. The next complication arises when the compared relations instead of having one term in common have no term in common. Wherever there are four magnitudes instead of three, sundry new laws come into force; the most important of which is, that the magnitudes need no longer be all of the same order. This leads us to the further complication arising when, instead of two equal relations, we have to deal with three. As in the axiom—"Relations that are equal to the same relation, are equal to each other;" in which each pair of relations is united in thought, after the same general manner as the foregoing pairs. And so with the still more complicated forms. Is it needful to point out how, by successive developments, the advance is from a simple intuition of the equality or inequality of two magnitudes, to a highly complex intuition of the equality or inequality of relations between relations?

291. It may be shown, *a priori*, that the process of quantitative reasoning must consist in the establishment of the equality or inequality of relations.

VI. PERFECT QUALITATIVE REASONING.

292. It was pointed out that the intuitions of coextension, coexistence, and connature, are the only intuitions through which we can reach exact conclusions. One class of these conclusions, in which the *quantity* of certain existences of determinate quality is predicated, has been examined. It

remains to examine a class in which the thing predicated is either the *quality* of certain determinate existences, or the existence of certain determinate *qualities*. We pass to the order of reasoning now to be treated of, when equality—indistinguishableness—is asserted of two relations that are alike in the natures of their terms, and in the coexistence of each antecedent with its own consequent.

293. Reasonings of the order which explicitly predicate time-relations only, exhibit, in a large class of cases, that same necessity often ascribed exclusively to quantitative reasonings. This group of cases is divisible into two subgroups; the one including disjoined relations and the other conjoined relations—the one always involving four phenomena and the other only three. The first includes the countless cases in which, from certain observed attributes of objects, we infer the presence of certain other attributes that are inseparable from them. As when, on seeing one side of an object, I know that there is an opposite side. The mental act is here an intuition of the equality of two disjoined time-relations—the one, a generalized relation of invariable coexistence, established by an infinity of experiences having no exception, and therefore conceived as a necessary relation; the other, a particular relation of coexistence, in which one term is not perceived but is implied by the presence of the accompanying term. The fact predicated in the second class, is either the coexistence or non-coexistence of certain things, as determined by their known relations to some third thing, or else the simultaneity or non-simultaneity of certain events, as determined by their known relations to some third event. Thus, if the events A and C stand in just the same time-relation to an event B, the cognition that they are simultaneous is involved. The mental act here being an intuition of the equality or inequality of two conjoined time-relations.

294. In conclusions of this kind only are apparently involved the axioms which J. S. Mill considered are involved in the syllogism. If we include simultaneity (momentary

c oexistence) in our idea of coexistence at large, it may be said that all the cases of conjunctive intuitions coming under the foregoing second division, severally recognize one or other of the two general propositions—"Things which coexist with the same thing coexist with another," and—"A thing which coexists with another thing, with which a third thing does not coexist, is not coexistent with that third thing." But in no other ratiocinative acts are these self-evident truths tacitly asserted.

295. Where the thing predicated is some necessary relation of phenomena in succession, the inference, like the previous ones, is reached by an intuition of the equality of relations.

VII. IMPERFECT QUALITATIVE REASONING.

296. While the conclusions of perfect qualitative reasoning are of such kinds that their negations cannot be conceived, those of imperfect qualitative reasoning can have their negations conceived with greater or less difficulty.

297. Imperfect qualitative reasoning is distinguished from perfect qualitative reasoning by the relative indefiniteness of its intuitions. Beginning with those grades in which the negation of the inference can be conceived only by the greatest effort; and ending with those in which it presents itself to the mind almost as readily as the affirmation; it is throughout discriminated from perfect qualitative reasoning, and from quantitative reasoning, by the peculiarity that the compared relations are no longer to be considered as *equal* or *unequal*, but, to use a more general word, as *like* or *unlike*. (*Psychology*, § 307.)

298. It follows from this that those cases of imperfect qualitative reasoning commonly given in Treatises of Logic, as illustrating the process of thought said to be expressed by the syllogism, severally exhibit intuitions of the likeness or unlikeness of relations. When, to quote a familiar case, it is said—"All horned animals are ruminants; this

is a horned animal; therefore this animal is a ruminant;" the mental act indicated is a cognition of the fact that the relation between particular attributes in this animal, is like the relation between homologous attributes in certain other animals. It is unnecessary here to treat of that compound qualitative reasoning exemplified in all cases where an inference is reached, not by a single intuition of the likeness or unlikeness of relations, but by a connected series of such intuitions. Such cases are analogous to those of compound quantitative reasoning, and consist, like them, of successive inferences that are sometimes severally perfect and sometimes only part of them perfect.

299. So-called syllogistic reasoning passes by an easy transition into reasoning by analogy, from which it differs simply in degree. If the subjects of the so-called major and minor premisses are considerably unlike, the conclusion that the relation observed in the first will be found in the last, is based on analogy; which is weak in proportion as the unlikeness is great. But if, everything else remaining the same, the assemblage named in the major premiss has added to it species after species, each of which, though considerably unlike the rest, has a certain group of attributes in common with them, and with the subject of the minor premiss; then, in proportion as the number of different species becomes great, does the conclusion that a relation subsisting in every one of them subsists in the subject of the minor premiss, approach to a deduction.

300. From that kind of imperfect qualitative reasoning which proceeds from generals to particulars, we pass to that kind which proceeds from particulars to generals: in other words—to inductive reasoning. Both kinds are carried on by comparison of relations. If the known relations grouped together as of the same kind, outnumber the unknown relations conceived to be like them, the reasoning is deductive; if the reverse, it is inductive. The inductive process applies alike to the establishment of the simplest relations between single properties, and the most complex relations

between groups of properties and between groups of objects. Between those earliest organically-registered inductions on which are based the almost automatic deductions that guide our movements from moment to moment, and those latest ones which only the highly-cultured man of science can draw, may be placed a series connecting them by scarcely sensible gradations. Throughout the whole series the essential act of thought is a cognition of the likeness between certain before-known relations and certain relations not yet known by perception, but represented by imagination. The trustworthiness of this cognition varies sometimes according to the numerical ratio between the observed and unobserved relations, sometimes according to the simplicity of their nature, sometimes according to their analogy to established relations, and sometimes according to all these.

301. In Reasoning from particulars to particulars, the form to which both Induction and Deduction may be degraded by continually diminishing the number of their observed or predicated facts, the mental act is an intuition of the likeness (or unlikeness) of one relation to one other relation. Thus, the act of thought remains throughout fundamentally similar.

VIII. REASONING IN GENERAL.

302. Before summing up let us seek a reconciliation between those who affirm that the syllogism presents analytically the mode in which all men reason, and those who affirm that the syllogism is valueless. This reconciliation is to be effected only by denying the tacit assumption of both, that the syllogism refers to the dependencies of our *thoughts*, and by affirming, contrariwise, that it refers to the dependencies of *things*. Those who do not avowedly recognize the antithesis of subject and object, must end by accepting one of these opposite estimates of the syllogism and rejecting the other; but for those who acknowledge

that subject and object are separate realities, there is a way of bringing these views into harmony, by showing how each is right in one sense and wrong in another. A distinction exists which, in consequence of its highly abstract nature, is not easily perceived, between the science of Logic and an account of the process of Reasoning which, once seized, disposes completely of the difficulty. It is that Logic formulates the most general laws of correlation among existences considered as objective; while an account of the process of Reasoning, formulates the most general laws of correlation among the ideas corresponding to these existences.

303. There appears to be among logicians a general agreement that a certain abstract truth said to be involved in every syllogism, is recognized by the mind in going through every syllogism; and that the recognition of this abstract truth under any particular embodiment, is the real ratiocinative act. Nevertheless, neither the *dictum de omni et nullo*—"that whatever can be affirmed (or denied) of a class may be affirmed (or denied) of everything included in the class;" nor any other axiom which it is possible to frame, can be rightly held capable of expressing the ratiocinative act.

304. A true theory must be coextensive with all the facts. The syllogism, if taken to represent the form of the inferential act, has the fundamental fault that it fails to cover the whole of the ground it professes to cover. There are simple as well as complex deliverances of reason which cannot be brought within the syllogistic form.

305. The process of thought formulated by the syllogism, is in various ways irreconcilable with the process of reasoning as normally conducted. It is irreconcilable as presenting the class while yet there is nothing to account for its presentation; as predicating of that class a special attribute while yet there is nothing to account for its being thought of in connexion with that attribute; as embodying in the minor premiss an assertory judgment, while the previous reference implies that the judgment has been tacitly formed before-

hand; and as separating the minor premiss and the conclusion, which ever present themselves to the mind in relation. The syllogism only enables us deliberately to verify some inferences already drawn.

306. Let us now return to consider the theory of Reasoning under its most general aspects. It is universally admitted that induction must precede deduction—that we cannot descend from the general to the particular, until we have ascended from the particular to the general. Not only of reasoning in its *ensemble* does this hold, but also, in a qualified sense, of each particular inference. As in the development alike of the general mind and the individual mind, qualitative reasoning precedes quantitative reasoning; so, each particular act of quantitative reasoning grows out of a preceding act of qualitative reasoning.

307. Let us now glance at the results that have been reached. We saw that in perfect quantitative reasoning there is equality among the terms in Space, Time, Quality, and among their relations in kind and degree; and that thus the idea of likeness rises to its greatest perfection (equality), and appears under the greatest variety of applications. While we saw that in imperfect quantitative reasoning the idea of exact likeness is no longer so variously involved. We next found that in perfect qualitative reasoning there is another diminution in the number of implied intuitions of equality. And further we found that in partiperfect qualitative reasoning, the number of such implied intuitions is again reduced; though there yet remains equality in the natures of the things dealt with, and in the natures of the compared relations. We have now to notice, what was not noticed in passing, that in imperfect qualitative reasoning we descend still lower; for in it, we have no longer complete equality of nature among the terms of the compared relations. The objects grouped together in an induction are never exactly alike in every one of their attributes; nor is the individual thing respecting which a deduction is made, ever quite indistinguishable in character from the

things with which it is classed. In the still lower reasoning by analogy, likeness of nature between the compared relations may be the only remaining likeness. Passing from the elements of rational intuitions to their forms, we find that these are divisable into two genera. In the one the compared relations, having a common term, are conjoined; and in the other the compared relations, having no common term, are disjoined. Perceiving, as the reader will, that the doctrine set forth applies to all orders of reasoning, he will see that it fulfils the character of a true generalization: that, namely, of explaining all the phenomena.

308. Our habitual modes of expression bear witness to the truth of the foregoing analysis. Thus we have the Latin *ratio*, meaning reason; and *ratiocinor*, to reason. This word *ratio* we apply to each of the two quantitative relations forming a proportion; and the word *ratiocination*, which is defined as "the act of deducing consequences from premisses," is applicable alike to numerical and to other inferences. Conversely, the French use *raison* in the same sense that *ratio* is used by us. Throughout, therefore, the implication is that *reason*-ing and *ratio*-ing are fundamentally identical.

309. It remains to point out that the conclusion we have arrived at may be reached even *a priori*. These truths:—That Reasoning, whether exhibited in a simple inference or in a chain of such inferences, is the indirect establishment of a definite relation between two things; and that the achievement of this is by one or many steps, each of which consists in the establishment of a definite relation between two definite relations; embody, under the most general form, the various results arrived at in the previous divisions.

IX. CLASSIFICATION, NAMING, AND RECOGNITION.

310. Every student of Reasoning has the truth thrust upon him at the outset of his studies, that there is a close alliance between Reasoning and Classification. The alliance

is much closer than is supposed, however. Their dependence is reciprocal. Reasoning presupposes Classification, and Classification presupposes Reasoning. They are different sides of the same thing—are the necessary complements of each other. In describing reasoning as the classification of relations, its near approach to the classification of entities has been implied. And if we remember that, on the one hand, classification of relations involves classification of the things or attributes between which they subsist, while, on the other hand, classification of entities involves classification of the relations among their constituent attributes; the kinship of the two will appear still closer. Likeness of relations is the intuition common to Reasoning and Classification; and it results in one or the other, according as the relations thought of are partial or total.

311. The kinship between Naming and Reasoning becomes manifest when we call to mind that originally a name is a copy of some real attribute of the thing named. All language being in the beginning mimetic. Beyond the fact that to ourselves the name of a thing occurs in thought just as any inferred attribute occurs, we have the fact that, originally, a name was *literally* an inferred attribute transformed—was an inference which, arising in the mind of one man by a representative act, was forthwith presentatively conveyed by him to other men.

312. Recognition differs from Classification partly in the fact that the two compared groups of relations usually present a much higher degree of likeness, but mainly in the fact that not only are the relations alike but the constituent attributes are alike. There are two kinds of differences which objects display: differences between their sensible properties, as considered separately; and differences between the modes in which these sensible properties are co-ordinated, or related to one another. And if there are no discernible differences between the corresponding properties or the corresponding relations, we know the object as one previously perceived—we identify it—we recognize it.

We must regard them both as forms of reasoning. Recognition differs from Classification simply in the greater speciality and definiteness of the inferred facts.

313. The general community of nature thus shown in mental acts called by different names, may be cited as so much confirmation of the several analyses. For this weakening of conventional distinctions—this reduction of these several operations of the mind, in common with all those hitherto considered, to variations of one operation, is to be expected as the result of analysis.

X. THE PERCEPTION OF SPECIAL OBJECTS.

314. It remains to be pointed out that surrounding things can become known only by acts of Classification or Recognition. Every perception of an external object implies, either the identification of it as a particular thing, or the ranging of it with certain kindred things. A special perception is possible, only as an intuition of the likeness or unlikeness of certain present attributes and relations, to certain past attributes and relations.

315. The perception by which any object is known as such or such, is always an acquired perception. The cognitions by which we guide ourselves from moment to moment, are all of them acquired perceptions; all of them involve the classification or recognition of attributes, groups of related attributes, and the relations between such groups; all of them embody inferences; all of them imply intuitions of likeness or unlikeness of relations.

316. And here we see again that the divisions made among the various mental processes have merely a superficial truth. We are forced to admit that it is only relatively, and not absolutely, that Reasoning is distinguished from Perception by its indirectness.

XI. THE PERCEPTION OF BODY AS PRESENTING DYNAMICAL, STATICO-DYNAMICAL, AND STATICAL ATTRIBUTES.

317. The relation established between object and subject in the act of perception, is threefold. If, while the subject is passive, the object is working an effect upon it, as by radiating heat, there results a perception of a *dynamical* property of body. If the subject is directly acting upon the object, as by pulling while the object is re-acting, a *statico-dynamical* property. If the subject alone is active, if that which occupies consciousness is something discerned *through* its actions or reactions—as size or position, a *statical* property. As before, let us commence with the most involved combinations; treating first of those *contingent* attributes known as secondary, but here called dynamical.

318. That these attributes are properly dynamical we may see, for they are throughout, if considered in their origin, activities pervading space; and can be ascribed to body only in the sense that body when exposed to them, reacts upon them, modifies them, and is known to us through the modifications. Strictly speaking, one of these simple sensations of colour, sound, scent, &c., involves a series of actions and reactions of which the object proximately yielding it manifests but the last. The light, or mechanical force, or heat, serving as its conspicuous cause, itself resulted from previous actions and reactions, which lead us back into an indefinite past filled with changes. But confining our attention to the elements with which we have immediately to deal, three things have to be contemplated: —First, a force, either diffused as light and heat or concentrated as momentum; second, an object on which some of that force is impressed, and which in so far as it is a recipient of force is passive, but in so far as it reacts and determines that force into new forms and directions is active; and third, a subject on whom some of the transformed force expends itself in producing what we term a sensation, and

who as the recipient of this transformed force is passive, but who may be rendered active by it. Literally, the so-called secondary attributes are neither objective nor subjective; but are the triple products of the subject, the object, and the environing activities. Sound, colour, heat, odour, and taste, can be called attributes of body only in the sense that they imply in body certain powers of reaction, which appropriate external actions call forth. These powers of reaction are the unknown properties in virtue of which body modifies the forces brought to bear upon it.

319. Let us now proceed to define the perception which we have of a body as ordinarily perceived. It is a state of consciousness formed thus:—Along with certain general impressions of resistance and extension, *unconditionally* standing to each other and the subject in relations of co-existence in time and adjacency in space; and along with certain specialized impressions of resistance and of extension, *conditionally* standing to each other and the subject in similar space-relations and slightly modified time-relations; there are certain impressions of a different order standing in a *doubly-conditional* manner to the previous ones, to the subject, and to one another, in space and time relations still further modified. This definition must not be taken as exhaustive. It is intended merely to display the relationship in which, as known to us, the dynamical attributes of body stand to its other attributes.

320. The mental act effecting one of these perceptions next claims our attention. So far, we have considered only the several elements which compose the perception; and there has yet to be considered the process by which they are co-ordinated. This is what may be termed a process of *organic classification.* For the semi-conscious classification which every complete perception of an object involves, *is necessarily preceded by a still less conscious classification of its constituent attributes, of the relations in which they stand to one another, and of the conditions under which such attributes and relations become known.* The perception of an

object is not otherwise possible. The foregoing definition of the perception of body as presenting the three orders of attributes, requires to be supplemented by this explanation; that the several attributes, the relations in which they stand to one another and to the subject, as well as the conditions under which only such attributes and relations are perceived, have to be thought of as like before-known attributes, before-known relations, and before-known conditions.

XII. THE PERCEPTION OF BODY AS PRESENTING STATICO-DYNAMICAL AND STATICAL ATTRIBUTES.

321. If we imagine a human being without sight, hearing, taste, smell, or the sense of temperature; then the only attributes of body cognizable by him, will be the statico-dynamical and the statical. These two classes of perceptions may accompany each other with various degrees of incompleteness; but *some* connexion between them is invariable.

322. The statico-dynamical attributes, which we will treat of first, are all known as manifestations of mechanical force, and are more numerous than would be supposed. *Heavy* and *Light* indicate amounts of gravitative force in relation to bulk. Of bodies that resist in different modes and degrees, we have the *Hard* and *Soft; Firm* and *Fluid; Viscid* and *Friable; Tough* and *Brittle; Rigid* and *Flexible; Fissile* and *Infissile; Ductile* and *Inductile; Retractile* and *Irretractile; Compressible* and *Incompressible; Resilient* and *Irresilient;* and (combined with figure) *Rough* and *Smooth.*

323. Of the sensations which constitute our perceptions of the statico-dynamical attributes of body; there are two which we may class as of objective origin, the sensation of *touch,* as when a fly settles on the forehead, and of *pressure* as when a weight is placed upon a finger resting on the table; and two which originate subjectively, the sensation of *muscular tension,* as when the arm is held out horizontally, and of *muscular motion,* as when one of the limbs is moved.

324. It is unnecessary to analyze our perceptions of all

the statico-dynamical attributes above enumerated. All which it here concerns us to know, is that they severally consist in the establishment of relations of simultaneity and sequence among our sensations of touch, pressure, tension, and motion; experienced as increasing, decreasing, or uniform; and combined in various modes and degrees.

325. The perception of body as presenting statico-dynamical and statical attributes, is a state of consciousness having for its primary elements the impressions of resistance and extension *unconditionally* united with each other and the subject in relations of coincidence in time and adjacency in space; having for its secondary elements the impressions of touch, pressure, tension, and motion, variously united with one another in relations of simultaneity and sequence, that are severally *conditional* on the nature of the object and the acts of the subject, all of them *conditionally* united with the primary elements by relations of sequence; and having for its further secondary elements certain relations, hereafter to be analyzed, which are also *conditionally* united alike with the primary elements and the other secondary elements. Such being the *constituents* of the perception, the *act* of perception consists in the classing these constituents, each with others of its own order.

XIII. THE PERCEPTION OF BODY AS PRESENTING STATICAL ATTRIBUTES.

326. We now pass to that remaining class of attributes known to us through a subjective activity only. In respect of its space-attributes—Bulk, Figure, and Position—body is altogether passive; and the perception of them is wholly due to certain mental operations. Extension is an attribute with which body does not impress us, but which we discover through certain of its other attributes.

327. Are the Space-attributes of body knowable through the eyes alone? Analysis shows that no image cast on the retina can be understood, or even distinguished from

another image widely different in form, until relations have been established between the separate sensitive agents of which the retina is constructed; that no relation between any two such agents can be known otherwise than through the series of sensations given by the intervening agents; that such series of sensations can be obtained only by motion of the retina; and that thus the primitive element out of which our ideas of visible extension are evolved, is a cognition of the relative positions of two states of consciousness in some series of such states consequent upon a subjective motion. Not that such relation between successive states of consciousness gives in itself any idea of extension. By the continued use of symbols and the union of them into more complex ones, are generated our ideas of visible extension —ideas which, like those of the algebraist working out an equation, are wholly unlike the ideas symbolized, and which yet, like his, occupy the mind to the entire exclusion of the ideas symbolized. We must remember that, underlying all cognitions of visible extension, is the cognition of relative position among the states of consciousness accompanying motion.

328. From the visual perception of body, we pass to the tactual perception of it—to such perception of Form, Size, and Position, as a blind man has. Our perceptions of all the space-attributes of body are decomposable into perceptions of positions, like that gained by a single act of touch. And our knowledge of the positions of objects, is built upon our knowledge of the positions of our members towards one another. That this knowledge is gained by bringing each part in contact with the others and moving the parts over one another in all possible ways; and that the motions as well as the touches involved in these mutual explorations, are known by their reactions upon consciousness; are propositions that scarcely need stating. But it is manifestly impossible to carry this analysis further without analyzing our perception of motion. For the present, therefore, we must be content with the conclusion that, whether visual or

tactual, the perception of every statical attribute of body is resolvable into perceptions of relative position which are gained through motion.

329. The Perception of body as presenting statical attributes, is a composite state of consciousness, having for its primary elements the indefinite impressions of resistance and extension, *unconditionally* united with each other and with the subject in relations of coincidence in time and adjacency in space; and having for its secondary elements sundry definite impressions of resistances, variously united with each other in relations of simultaneity and sequence that are severally *conditional* on the nature of the object and the acts of the subject, and all of them *conditionally* united with the primary elements by relations of sequence. To which there is only to add, as before, that these being the *materials* of perception, the *process* of perception consists in the unconscious classing of these impressions, relations, and conditions, with the like before known ones.

XIV. THE PERCEPTION OF SPACE.

330. In the last division, much has been tacitly asserted respecting our perception of Space. The consideration of occupied space cannot be dissociated from the consideration of unoccupied space. The two being distinguished as resistant extension and non-resistant extension, it is impossible to treat of either without virtually treating of both. Those who have followed the argument thus far, will see reasons for holding that Space, considered as subjective, is derived by accumulated and consolidated experiences from Space considered as objective. If Space be an universal form of the *non-ego*, it must produce some corresponding universal form in the *ego*—a form which, as being the constant element of *all* impressions presented in experience, and therefore of *all* impressions represented in thought, is independent of every *particular* impression, and consequently remains when every particular impression is, as far as possible, banished.

331. Continuing our analysis, the first question becomes —How, through experiences of occupied extension, or body, can we ever gain the notion of unoccupied extension, or space? As we find that a certain movement of the hand which once brought it in contact with something hot, now brings it in contact with something sharp, and now with nothing at all; and as we find that a certain movement of the eye which once was followed by the sight of a black object, is now followed by the sight of a white object, and now by the sight of no object; it results that the idea of the particular position accompanying each one of these movements, is, by accumulated experiences, *dissociated* from objects and impressions. It results, too, that as there are endless such movements, there come to be endless such positions conceived as existing apart from body. And it results, further, that as in the first and in every subsequent act of perception, each position is known as coexistent with the subject, there arises a consciousness of countless such coexistent positions; that is—of Space. On bearing in mind the inheritance of latent experiences, the early commencement of the experiences that verify and complete them, the infinite repetition of them, and their absolute uniformity; and on further remembering the power which, in virtue of its structure, the eye possesses of partially suggesting to the mind countless such experiences at the same moment; it will become possible to conceive how we acquire that consolidated idea of space in its totality, which at first seems so inexplicable.

332. The general theory of the space-intuitions which we recognize as necessary, the reader will now see is that they are the fixed functions of fixed structures that have become moulded into correspondence with fixed outer relations. How completely the hypothesis of Evolution supplies a reconciliation between the experience-hypothesis as commonly interpreted, and the hypothesis of the transcendentalists, is here again displayed. For while we are enabled to recognize the truth which lies in the doctrine of

a "pre-established harmony," and the truth which lies in the doctrine of "forms of intuition;" we are enabled to interpret these truths as corollaries from the doctrine that all intelligence is acquired through experience: we have but to expand this doctrine so as to make it include, with the experience of each individual, the experiences of all ancestral individuals. By regarding these data of intelligence as *a priori* for the individual, but *a posteriori* for the entire series of individuals of which he forms the last term, we escape the difficulties of both hypotheses as currently understood.

333. We may fitly conclude by alluding to sundry peculiarities in our conception of space, quite irreconcilable with the Kantian hypothesis, but which harmonize completely with the hypothesis that has been set forth. Without insisting on the fact that our sensations of sound and odour do not originally carry with them the consciousness of space at all, there is the fact that along with those sensations of taste, touch, and sight which do carry this consciousness with them, it is carried in extremely different degrees—a fact quite unaccountable if space is given before all experience as a form of intuition. That our consciousness of adjacent space is far more complete than our consciousness of remote space, is also at variance with the hypothesis; which, for aught that appears to the contrary, implies homogeneity. Similarly with that variation in the distinctness of surrounding parts of space which occurs as we turn our eyes now to one point and now to another. And so, too, that in morbid states space should appear "swelled," is, on the Kantian theory, unaccountable; seeing that the *form* of intuition should remain constant, whether the intuition itself be normal or abnormal.

334. When it comes to be shown that the ultimate element into which the consciousness of space is decomposable—the relation of coexistence—can itself be gained only by experience; the utter untenableness of the Kantian doctrine will become manifest.

335. The process of organic classification is again very clearly exhibited in the perception of space. The materials of the perception having been gained in the way described, the co-ordination of them into any particular perception consists in the assimilation of each relation of position to the like before-known relations.

XV. THE PERCEPTION OF TIME.

336. That in early ages, and in uncivilized countries, men should have expressed Space in terms of Time, and that afterwards, as a result of progress, they should have come to express Time in terms of Space; may serve to show the reciprocity between our cognitions of Space and Time, and the consequent impossibility of considering either of them entirely alone.

337. Time, like Space, cannot be conceived except by the establishment of a relation between at least two elements of consciousness: the difference being that while, in the case of Space, these two elements are, or seem to be, present together, in the case of Time they are not present together. Two events are known to us by the states of consciousness they produced. We know them as having certain *places* in the whole series of states of consciousness experienced during our lives. The time at which each occurred is known to us as its *position* in the series. And by the time between them, we mean their *relative positions* in the series. Thus, a particular time is a relation of position between some two states in the series of states of consciousness. And Time in general, as known to us, is *the abstract of all relations of position among successive states of consciousness.* Or, using other words, *the blank form in which these successive states are presented and represented; and which, serving alike for each, is not dependent on any.*

338. The consciousness of Time, in contradiction to the Kantian hypothesis, is not at first known as a sequence. After various relations of position among states of con-

sciousness have been contemplated, have been compared, have become familiar; and after the experiences of different relations of position have been so accumulated as to dissociate the idea of the relation from all particular positions; then, but not till then, can there arise that abstract notion of *relativity of position* among successive states of consciousness which constitutes the notion of their several places in time, and that abstract notion of *aggregated relative positions* which constitutes the notion of Time in general.

339. We have seen (*Psychology*, § 91), that the consciousness of Time must vary with size, structure, and functional activity. Consequently, the constitution derived from ancestry settles the general character of the consciousness within approximate limits.

340. It needs only to say respecting the perception of a portion of time, that it consists in the classing of the relation of serial positions contemplated as forming it, with certain before-known relations—the cognition of it as like such before-known relations.

XVI. THE PERCEPTION OF MOTION.

341. Though in our adult consciousness of Motion the ideas of Space and Time are inextricably involved, there is another element in that consciousness which we may see would remain were the ideas of Space and Time absent. It is that of muscular sensation, exemplified when we move any part of the body. Can the consciousness we have of Motion be evolved out of this primitive consciousness?

342. Passing over for the present the visual phenomena, the whole controversy respecting the genesis of our ideas of Motion, Space, and Time, centres in the question—How do we become cognizant of the relative positions of two points on the surface of the body? Such two points considered as coexistent, involve the germinal idea of Space. Such two points disclosed to consciousness by

two successive tactual sensations, involve the germinal idea of Time. And the muscular sensations by which, when self-produced, these two tactual sensations are separated, involve the germinal idea of Motion. In what order do these germinal ideas arise? And—How are they developed?

343. Let us call two points on the body of a partially-developed creature, and within reach of its limbs, A and Z. When a limb is moved along the surface between these points, the nerve fibres A, B, C, . . . Z, are excited in succession; that is, produce successive states of consciousness. But when something covers the whole surface between A and Z, they are excited simultaneously; and produce what tends to become a single state of consciousness. When the successive states of consciousness A to Z, are thought of as having relative positions, the notion of Time becomes nascent. When these states of consciousness occur simultaneously, their relative positions, which were before sequent, become coexistent; and there arises a nascent consciousness of Space. And when these two relations of coexistent and sequent positions are both presented to consciousness along with a series of sensations of muscular tension, a nascent idea of Motion results. The development of these nascent ideas by accumulation and comparison of experiences, will be seen to follow.

344. The development of this triple consciousness of Motion, Time, and Space, must not be taken as though some elements of it were fully organized before the rest, and independently of them, for the three notions are evolved concurrently. We have to regard the perpetual converse of the organism with its environment, and of its parts with one another by mutual explorations, as building up this triple consciousness, element by element; as the nervous system itself is built up, fibre by fibre, and cell by cell. There is strong reason to believe that this mutual exploration by surfaces of the body, itself aids the multiplication of separate sentient areas, at the same time that it develops the consciousness of their relations.

345. It remains to be added that sight, by serving clearly to establish in our minds the identity of subjective and objective motion, enables us to dissociate Motion almost entirely from those muscular sensations through which it is primarily known to us; and that by doing this, and by so reducing our idea of Motion to that of coexistent positions in Space occupied in successive positions in Time, it produces the apparently necessary connexion between these three ideas.

346. The perception of Motion, as we know it, consists in the establishment in consciousness of a relation of simultaneity between two relations—a relation of coexistent positions in Space, and a relation of sequent positions in Time. And in the act of perception, these jointly-presented relations are severally assimilated to the like relations before-known.

XVII. THE PERCEPTION OF RESISTANCE.

347. By successive decompositions of our knowledge into simpler and simpler components, we must come at last to the simplest—to the substratum. What is this substratum? It is the impression of resistance. This is the primordial, the universal, the ever-present constituent of consciousness.

348. Matter, Space, Motion, and Force—all our fundamental ideas, arise by generalization and abstraction from our experiences of resistance. Action by direct contact being the primary action, the unceasing action, the all-important action, as well as the simplest and most definite action, becomes the kind of action which all other kinds of action represent. And the sensation of resistance through which this fundamental action is known, becomes the mother-tongue of thought; in which all the first cognitions are registered, and into which all symbols afterwards learnt are interpretable.

349. This last position will be confirmed, on observing that all the sensations through which the external world

becomes known are explicable by us only as resulting from certain forms of force as thus conceived. Though the proposition that objective force differs in nature from force as we know it subjectively, is verbally intelligible; and though the supposition that the two are alike commits us to absurdities that cannot be entertained; yet to frame a conception of force in the *non-ego* different from the conception we have of force in the *ego* is utterly beyond our power.

350. The perception of resistance is thus fundamental as being the perception into which all other perceptions are interpretable, while itself interpretable into none. Knowledge of resistance is gained through the sensations of pressure and muscular tension. And equally early though these are, it may be readily proved that in the order of constructive thought the sensation of muscular tension is primary and that of pressure secondary. Hence the consciousness of muscular tension forms the raw material of primitive thought. It is the primitive element in our intelligence.

351. It has still to be pointed out that the perception of resistance, that is of muscular tension, consists in the establishment of a relation between the muscular sensation itself and that state of consciousness which we call *will*—a relation such that the unbalanced surplus of feeling of whatever kind, which for the moment constitutes the will, is the antecedent of the muscular sensation, and coexists with it while it lasts. To which there is only to add that in the act of perception this relation is classed with the like before-known relations; and that in so classing it, consists the knowledge of the special muscular combination, adjustment, and degree of force exercised.

XVIII. PERCEPTION IN GENERAL.

352. As foregoing divisions have made sufficiently manifest, the term Perception is applied to mental states infinitely varied, and even widely different in their natures. A perception may vary indefinitely in complexity, in degree of

directness, and in degree of continuity. It passes at the one extreme into reasoning and at the other borders upon sensation. So that, the term Perception must not be understood as signifying any truly scientific division.

353. The only valid distinction to be drawn is that between Perception and Sensation. Though under some aspects Sensation must be regarded as one species of Perception, it will readily be seen to differ widely from Perception proper—from the cognition of an external object. In the one case, that which occupies consciousness is something contemplated as belonging to the *ego;* while in the other, it is something contemplated as belonging to the *non-ego.* Generalizing the facts, it would seem, not that Sensation and Perception vary inversely as has been asserted, but that they exclude each other with degrees of stringency which vary inversely. When the sensations (considered simply as physical changes in the organism) are weak, the objective phenomenon signified by them is alone contemplated. When the sensations are rendered somewhat more intense, the perception continues equally vivid; but it requires less effort than before to make them the subjects of thought. But finally, if the sensations rise to extreme intensity, consciousness becomes so absorbed in them, that only by great effort, if at all, can the thing causing them be thought about.

354. Perception is an establishment of specific relations among states of consciousness; and is thus distinguished from the establishment of these states of consciousness themselves. The sensation is known as an undecomposable state of consciousness. The outward object is known through a decomposable state of consciousness; and is identified in virtue of the manner in which the component states are united.

355. From its simplest and rarest form, the consciousness of a single relation, Perception rises not only in the number and complexity of the relations grasped together, but also in the variety of their kinds.

356. It now remains only to apply the analysis thus far

pursued to the relations themselves. We must now resolve the special kinds of relations into more general kinds, ending with the primordial kinds; and then ascertain what are the ultimate phenomena of consciousness which these primordial kinds express.

XIX. THE RELATIONS OF SIMILARITY AND DISSIMILARITY.

357. Of all relations the most complex is that of Similarity. The similarity which we predicate of natural objects belonging to the same species, is made up of many component similarities. The similarities of sequences admit of another species of complication; namely, that arising from composition of causes and composition of effects.

358. Speaking most generally, the consciousness of Similarity arises when two successive states of consciousness are severally composed of like states of consciousness arranged in like ways. And when complete it is a consciousness of the cointension of two connatural relations between states of consciousness, which are respectively like in kind but commonly unlike in degree.

359. Conversely, the consciousness of Dissimilarity is a consciousness of the non-cointension of two connatural relations between states of consciousness which are respectively like in kind, but commonly unlike in degree. Let us proceed to consider these more general relations.

XX. THE RELATIONS OF COINTENSION AND NON-COINTENSION.

360. The states of consciousness between which relations of cointension subsist, may be primary or secondary—may be simple states or the relations among simple states.

361. There can be no phenomena of consciousness beyond its successive states and the modes of succession of its states —the states themselves and the changes from one state to another. And since what we distinguish as relations are not the primitive states themselves, they can be nothing

else than the changes from state to state. The two answer in all respects. We can think neither of a change nor of a relation without thinking of the two terms forming its antecedent and consequent. As we cannot think a relation without a change in consciousness from one of its terms to the other; so we cannot think a change without establishing a relation between a preceding phenomenon and a succeeding one. The bearing of this conclusion on the inquiry before us is this. Relations, subjectively considered, being nothing but changes in the state of consciousness, it follows that the cointension of relations is the cointension of such changes; or, in other words—likeness in degree between changes like in kind.

362. The relation of cointension among the primary states of consciousness themselves, is of course definable as—likeness in degree between feelings like in kind. The relation of non-cointension is unlikeness in degree between either changes like in kind or feelings like in kind.

XXI. THE RELATIONS OF COEXTENSION AND NON-COEXTENSION.

363. It follows from what has been said when treating of Space and of the statical attributes of Body, that two equal extensions are originally known to us as two equal series of united sensations of motion and touch. Coextension, when reduced to its lowest terms, means—equality in the length of such series; that is—equality in the numbers of the states they severally include.

364. The relation of coextension, as subjectively considered, may be defined as the likeness of two compound states of consciousness, visual or tactual, in respect of the number and order of the elementary relations of coexistence which they severally include: such compound states of consciousness being severally produced by the consolidation of what were originally known as serial states. The relation of non-coextension is definable as the unlikeness of such two compound states of consciousness.

XXII. THE RELATIONS OF COEXISTENCE AND NON-COEXISTENCE.

365. Though to the developed mind apparently undecomposable, the relation of coexistence must be originally compound. It implies at least two things, and these cannot occupy consciousness at the same instant in the same degree.

366. By an incipient intelligence, two things A and B, seen in succession, cannot be known to differ in their persistence from two sounds heard one after the other. In either case there is nothing but a sequence of impressions. How, then, do the two relations come to be distinguished? Simply by finding that whereas the terms of the first can be known *in the reverse order* with equal vividness, those of the second cannot. It is perpetually found that while certain states of consciousness follow each other with as much facility and clearness in one direction as in the opposite (A, B—B, A), others do not; and hence results a differentiation of the relation of coexistence from that of sequence.

367. The relation of coexistence under its primary simple form, is to be defined as a union of two relations of sequence, which are such that while the terms of the one are exactly like those of the other in kind and degree, and exactly contrary to them in their order of succession, the two relations are exactly like each other in the feeling which accompanies the succession. The relation of non-coexistence differs in this, that though one of the two changes occurs without any feeling of tension, the other does not.

368. These conclusions are indicated even by *a priori* considerations. They also supply an ultimate disproof of the hypothesis that Space is a form of intuition.

XXIII. THE RELATIONS OF CONNATURE AND NON-CONNATURE.

369. That two changes in consciousness are of like kind, is a fact of which we can give no account further than that we perceive it to be so. As subsisting between relations,

the relation of connature must be defined as—likeness of kind between two changes in consciousness.

370. Respecting the relation of connature as subsisting between the primary states of consciousness, still less is to be said. The relation of non-connature is—unlikeness in kind between either changes in consciousness or the states which they connect.

XXIV. THE RELATIONS OF LIKENESS AND UNLIKENESS.

371. At length continued analysis has brought us down to the relations underlying not only all preceding relations, but all processes of thought whatever. From the most complex and most abstract inferences down to the most rudimentary intuitions, all intelligence proceeds by the establishment of relations of *likeness* and *unlikeness*.

372. By unlikeness and likeness we mean respectively, *change* and *no change* in consciousness. The two terms of a relation of unlikeness are two states of consciousness forming the antecedent and consequent of a *change* in consciousness. The two terms of a relation of likeness are the antecedent and consequent of what, in one sense, is *no change;* seeing that it leaves consciousness in the same condition as before.

373. Accurately speaking, a relation of likeness consists of two relations of unlikeness which neutralize each other. It is a change from some relatively-enduring state A to another state x (which represents the feeling we have while passing from one of the like things to the other), and a change from this transitory state x to a second relatively-enduring state A: which second state A would be indistinguishable from the first state were it not divided from it by the state x. Thus the relation of unlikeness is the primordial one—is the relation involved in every other relation; and can itself be described in no other way than as a *change* in consciousness.

XXV. THE RELATION OF SEQUENCE.

374. This remaining relation is but another side of the one just treated of. For the ultimate relation is nothing more than a *change* in the state of consciousness; and we call it either a relation of unlikeness or a relation of sequence, according as we think of the *contrast* between the antecedent and consequent states, or of their *order*.

375. Beyond thus describing each aspect of this relation in terms of the other aspect, no account can be given of it. The relation of sequence, considered subjectively as a change in consciousness, is of three general kinds. The fortuitous, in which the two terms are as nearly as may be *alike* in their tendency, or want of tendency, subsequently to suggest each other; and in which the change may be reversed in thought with a feeling of non-resistance *like* that with which it originally occurred. The probable, in which the terms are *unlike* in their tendency to suggest each other; but in which the usual order of the terms may be inverted with but little effort. And the necessary, in which the antecedent being presented or represented to consciousness, the consequent cannot be prevented from following; and in which the direction of the change cannot be changed.

376. The classification of sequences is thus itself effected through other sequences. As all relations are finally reducible to one, which is nothing else than a *change* in consciousness, it follows, even *a priori*, that all relations among the changes in consciousness must themselves be other changes.

XXVI. CONSCIOUSNESS IN GENERAL.

377. A full comprehension of this truth that the primordial element of all intelligence is simply a change, and that every complex mental phenomenon is a co-ordinated group of changes, would be best gained by arranging synthetically the results lately reached by analysis.

378. Synthesis would show that at the very outset there are involved the materials of those fundamental relations to which analysis has, from the very beginning, pointed. It would serve to make comprehensible how, out of change, kind of change, degree of change, facility of change, arrangement of change, &c., the infinitely-varied states of consciousness may be elaborated. And it would serve to suggest how, by the ever-increasing consolidation of changes—the running together of larger and larger groups and series of them—there can arise, out of internal phenomena originally successive, the means of representing those extremely-complicated phenomena of coexistence which constitute the external world.

379. It is hardly necessary to say that these successive complications can arise only by insensible degrees. The organization of experiences must conform to the laws of organization in general; and must therefore be extremely slow.

XXVII. RESULTS.

380. The various divisions which we ordinarily make among our mental operations, are thus merely to be understood as indicating modifications of detail which distinguish phenomena that are essentially similar—modifications which do but mask that fundamental unity of composition possessed by all cognitions whatever.

381. Not only the *form* of thought, but the *process* of thought, is the same throughout. When regarded under its fundamental aspect, the highest reasoning is one with all the lower forms of human thought, and one with instinct and reflex action, even in their simplest manifestations. The universal process of intelligence is the *assimilation* of impressions. And the differences displayed in the ascending grades of intelligence are consequent upon the increasing complexity of the impressions assimilated.

382. We have seen that consciousness can neither arise nor be maintained, without the occurrence of differences in

its state. It must be ever passing from some one state into a different state. And for the new state hence resulting to become a thought, it must be integrated with before-experienced states. Under its most general aspect, all mental action whatever is therefore definable as *the continuous differentiation and integration of states of consciousness.*

383. The only fact of importance remaining to be pointed out, is that the widest truth disclosed by the inquiries of biologists is parallel to the one at which we have just arrived. In two senses there is a continuous differentiation and integration throughout the body; as, in two senses, there is a continuous differentiation and integration throughout the mind. The ultimate generalizations of Psychology and Physiology are expressions of the same fundamental process of Life.

CHAPTER XV.

GENERAL ANALYSIS.

"an inquiry concerning the basis of our intelligence. Its object is to ascertain the fundamental peculiarity of all modes of consciousness constituting knowledge proper—knowledge of the highest validity."

I. THE FINAL QUESTION.

384. Taking for granted the objective A B, and its connexion with the subjective *a b*, (*Psychology*, § 53), we have in the foregoing chapters examined how the correspondence of the subjective *a b* is established. The other problem—the theory of the connexion between A B and *a b*—has now to be entered upon. In other words, we now pass from our inquiry concerning the nature of the human mind to an inquiry concerning the nature of human knowledge.

385. Knowledge implies something known and something which knows; if Objective Science is distinguished as the theory of the known, and Subjective Science as the theory of that which knows; it becomes manifest that a theory of knowledge, which answers to what is commonly called Metaphysics, is a co-ordination of the two.

386. We are now called upon to reconsider those "fundamental intuitions" which, when treating of "The Data of Philosophy," were "temporarily accepted as unquestionable" (*First Principles*, § 39); and to see whether they admit of being unified with the coherent body of conclusions to which acceptance of them has led us.

387. In other words, the vexed question of Subject and Object has to be taken up. The relation between these, as antithetically-opposed divisions of the entire assem-

blage of manifestations of the Unknowable, was our datum. The fabric of conclusions built upon it must be unstable if this datum can be proved either untrue or doubtful. Should the idealist be right, the doctrine of Evolution is a dream.

II. THE ASSUMPTIONS OF METAPHYSICIANS.

388. How happens it that metaphysicians have so unfaltering a faith in one mode of intellectual action, and are so ready to treat with comparative disregard the results reached through another mode of intellectual action?

389. The answer is, that metaphysicians greatly overrate a particular mode of mental action. Through Reasoning multitudes of marvellous results have been reached; and Reasoning consequently has come to excite an amount of faith greatly in excess of that which is its due.

390. Reason has absorbed, as it were, the strengths of all the errors it has subdued; and the unquestioning respect once felt for all these errors, swells by accumulation into a servility which never dreams of asking for the credentials of this power that has expelled them.

391. Deliverances of consciousness are of two kinds—the one given through a process comparatively direct, the other given through a process comparatively indirect. Most men take for granted that when the results of the two processes are at variance, those reached by the direct process must be accepted. The few metaphysicians however, on the contrary, assume that the indirect process is supreme.

III. THE WORDS OF METAPHYSICIANS.

392. The meaning acquired by each word during its development has been determined partly by its genealogy and partly by its environment. Each word has both an intrinsic connotation and an extrinsic connotation. Each

word does not simply imply, with various degrees of distinctness, the meanings of ancestral words; but it implies also the meanings of coexisting words, which limit and extend and individualize its meaning, and in the absence of which it is meaningless. This being understood, we are prepared to examine the language used by metaphysicians, and to mark all its direct and indirect implications.

393. At the outset of his *Principles of Human Knowledge*, Berkeley discusses the use of abstract words; observing, very truly, that in no case can an abstract word be rendered into thought without some one or more of the concrete meanings embraced by it being thought of. Early in the next chapter occur these words—"*By sight I have the ideas of light and of colours.*" A careful examination of every word of which tells the same story. Each word, alike by its inherited constitution, and by those specializations which enable it to co-operate with other words, proves itself to be organized in conformity with the fundamental relation of subject and object. And the same story is told by each clause of the sentence. *By sight I have*, if we reduce it from the abstract to the concrete, as Berkeley insists that we ought, inevitably means that *I*, through the *agency of my eye*, receive *something;* and it is impossible to think of receiving something through an agent without being conscious of a third thing from which my agent receives that something. The other clause, *idea of red* (to reduce the abstract *colour* to a concrete) just as certainly involves the same consciousness—involves the two separate existences *idea* and *red*, as much as "son of John" involves the two separate existences, John and his son. When we put together these clauses, the indefinite meaning of the first, which is that through an agent I receive something from something, is made definite; and I learn that through this agent I receive from something *red* an *idea*, which I call an *idea of red*. The whole sentence, its divisions, and its ultimate parts, separately and jointly yield this meaning; and no one, metaphysician or other, can so suppress the established

associations of the words as to keep this meaning out of his mind. It is impossible to say with Berkeley that the only existences are in the mind, and that the being of everything is the being perceived.

394. The language of Hume furnishes matter for such further criticism as is needful. For it turns out that if the words *impressions* and *ideas* are supposed—as they are by Hume—not to have the connotations which they actually have, the words along with which they are used cease to have their ordinary meanings and get opposite ones. So long as I interpret to myself an *impression* as connoting something that impresses and something that is impressed —so long as I recognize these two somethings as independent existences of which the one affects the other, the meaning of the word *impression* remains intelligible; and all the peculiarities of an *impression* become comprehensible as caused by the changing relations between the two existences. But if I suppose myself capable of thinking of an *impression* as existing without these two connoted existences; then it results that in giving to it a meaning which it has not, I take away from the co-operating words all the meanings they had.

395. We may gather from the foregoing the significant fact that *language absolutely refuses to express the idealistic and sceptical hypotheses.* Language has been throughout its development moulded to express all things under the fundamental relation of subject and object, just as much as the hand has been moulded into fitness for manipulating things presented under this same fundamental relation; and if detached from this fundamental relation, language becomes as absolutely impotent as an amputated limb in empty space.

IV. THE REASONINGS OF METAPHYSICIANS.

396. Granting the metaphysicians all which the two foregoing divisions have denied, let us here examine

their reasonings and see whether they can make out their case.

397. Imaginary conversation affords great facilities for gaining a victory. When you can put into an adversary's mouth just such replies as fit your purpose, there is little difficulty in reaching the desired conclusion. Berkeley's *Dialogues of Hylas and Philonous* furnish abundant illustrations of this. *Hylas* repeatedly assents to propositions which, on his opponent's own principles, he should not have assented to. We see this in the dialogue on the subjectivity of heat, for Berkeley's argument is brought to a dead-lock at the outset whatever answer is given. If to his question respecting the sensibility of matter there be given the reply which is alone consistent with his hypothesis, that it is impossible to say, his argument cannot proceed. And the acceptance of the reply that it is *not* sensitive, is equally fatal with the rejection of the reply that it *is* sensitive. Since neither the truth of the one, nor the untruth of the other, can be discerned without a recognition of the subject (material substance) as well as the predicate (sense and perception).

398. Either the sceptical conclusions Hume draws are legitimately deducible from the premises he lays down, or they are not. If they are not so deducible, then his reasoning, being inconsequent, need not be examined. If they are legitimately deducible, then they are invalidated by the badness of the premises. A logical apparatus that is to overturn the deepest of human beliefs, must have an extremely firm basis; must have parts rigid enough to bear any strain; and must have these parts so firmly articulated that there is no dislocating them. Far from finding that the co-ordinated groups of propositions with which Hume sets out, fulfil this requirement, careful examination shows them to be incapable of bearing any strain at all—shows them to be altogether incoherent. Nay, worse than incoherent. On trying to fit them together, to see how they will work as an argument, we discover that the

different parts absolutely refuse to join one another; and tumble apart as fast as they are placed in apposition.

399. It is curious to see a doctrine which positively contradicts our primary cognitions, chosen as a refuge from another doctrine which simply doubts them. In the philosophy of Kant, however, this is done. Scepticism, questioning all things, professes to decisively affirm nothing. Kantism, in anxiety to escape it, decisively affirms things contrary to universal belief. As an illustration may be taken the Kantian doctrine of Time and Space. Consider, first, the thing affirmed—that Time and Space are subjective forms, or properties of the *ego*. Is it possible to realize the meaning of these words? Or are they simply groups of signs which seem to contain a notion but really contain none? An attempt to construct the notion will quickly show that the latter is the fact. Think of Space—of the thing, that is; not of the word. Now think of Self—of that which is conscious. Having clearly represented them, put the two together, and conceive the one as a property of the other. What results? Nothing but a conflict of two thoughts that cannot be united. It would be as practicable to imagine a round triangle. What, then, is the worth of the proposition? If, as Sir W. Hamilton puts it, those propositions only are conceivable of which subject and predicate are capable of *unity of representation*, then is the subjectivity of Space inconceivable; for it is impossible to bring the two notions, *Space* and *property of the ego*, into unity of representation. Consider next that which is, by implication, denied. To affirm that Time and Space belong to the *ego*, is simultaneously to affirm that they do not belong to the *non-ego*. Beyond the above positive proposition, which it is impossible to think, there is thus a correlative negative proposition, which it is equally impossible to think. While, in the one case, the assertion is that two things are united in fact which we are wholly unable to unite in thought; in the other case, the assertion is that two things are disunited in fact which we are wholly unable to disunite in thought.

By no effort can any one separate, or think away, Space and Time from the objective world, and leave the objective world behind. The proposal to imagine a square divested of its equiangularity is a kindred proposal. Is it needful to remind the reader that the facts of consciousness supposed to be interpretable only on the Kantian hypothesis, are interpretable on the Experience-hypothesis, when it is adequately expanded? We have seen that if, in pursuance of the doctrine of Evolution, we suppose the modifications produced by experience to be inheritable, it must happen that if there are any universal forms of the *non-ego*, these must establish corresponding universal forms in the *ego*. These forms, being embodied in the organization, will impress themselves on the first intuitions of the individual; and will thus appear to antecede all experience. But they will nevertheless be forms which, when analyzed, prove to be derived from that same ultimate consciousness of likeness and unlikeness into which all experience is resolvable.

400. The reasoning of Sir W. Hamilton shows us how that rejection of the direct testimony of consciousness which Kantism involves, leads to contradiction when joined with that acceptance of the direct testimony of consciousness implied by "Natural Realism."

401. Such then are metaphysical reasonings. Have they the requisite cogency? So far from having it, they are full of defects which would invalidate quite ordinary inferences.

V. NEGATIVE JUSTIFICATION OF REALISM.

402. The foregoing glance at the metaphysical position may serve as an introduction to the analytical argument on which we are now to enter. By a negative justification of Realism is meant a proof that it rests on evidence having a greater validity than the evidence on which any counter hypothesis rests. Before proceeding to an ultimate analysis, we will advance the examination a stage by making a proximate analysis.

VI. THE ARGUMENT FROM PRIORITY.

403. The metaphysician from persistently contemplating the sequences of thought in a certain hypothetical order, exactly opposite to their real order, eventually comes to think the hypothetical to be the real order and the real order the hypothetical; as with the microscopist neutralizing the apparent inversions of his object.

404. The postulate with which metaphysical reasoning sets out, is that we are primarily conscious only of our sensations—that we certainly know we have these, and that if there be anything beyond these serving as cause for them, it can be known only by inference from them. Limiting the proposition to those epi-peripheral feelings produced in us by external objects (for these are alone in question), there is no alternative, however, but to affirm that the thing primarily known, is not that a sensation has been experienced, but that there exists an outer object. Instead of admitting that the primordial and unquestionable knowledge is the existence of a sensation, the fact, borne out when the phenomena of consciousness are inspected in their order of genesis, is, that the existence of a sensation is an hypothesis that cannot be framed until external existence is known.

405. These metaphysical confusions have arisen from confounding two quite distinct things—having a sensation, and being conscious of having a sensation. The simple consciousness of sensation, uncomplicated by any consciousness of subject or object, is doubtless primordial. Through immeasurably long and complex differentiations and integrations of such primordial sensations and derived ideas, there develops a consciousness of self and a correlative not-self. Far later than this is reached a final stage, at which it becomes possible for the developed self to contemplate its own states as affections produced in it by the not-self. And this final stage is spoken of by metaphysicians as though it were the initial stage!

406. In brief, the argument from priority is this :—That in the history of the race, as well as in the history of every mind, Realism is the primary conception; that only after this has been reached, and long held without question, does it become possible even to frame the Idealistic conception, while resting upon the Realistic one ; and that then, as ever after, the Idealistic conception, depending on the Realistic one, must vanish the instant the Realistic one is taken away.

VII. THE ARGUMENT FROM SIMPLICITY.

407. The mental process which yields Realism, differs immensely in length from the mental process said to yield Idealism or Scepticism. The one is so simple and direct as to appear, at first sight, undecomposable; while the other, long, involved, and indirect, is not simply decomposable, but requires much ingenuity to compose it.

408. If the deliverance of consciousness which yields Realism is immediate, everything is surrendered, and the controversy ends. If it is mediate, as with that deliverance of consciousness said to yield Idealism, in what respect do they differ? The most conspicuous difference is, that while the one involves but a single mediate act, the other involves a succession of mediate acts, each of which is itself made up of several mediate acts. The one mediate act of Realism cannot be invalidated by the multitudinous mediate acts of Idealism.

409. It could only be invalidated on the supposition that, if there is doubtfulness in a single step of a given kind, there is less doubtfulness in many steps of the same kind.

VIII. THE ARGUMENT FROM DISTINCTNESS.

410. All persons, *ceteris paribus*, accept the deliverances of consciousness given in vivid terms in preference to those given in faint terms. The deliverances of consciousness composed of sensations, are unhesitatingly preferred to those composed of the ideas of sensations.

411. The one proposition of Realism is presented in vivid terms; and each of the many propositions of Idealism or Scepticism is represented in faint terms. Let us grant that in both cases the process of thought is inferential. The two are nevertheless contrasted in this, that the single inference of the one is made up of elements most, if not all, of which have the highest degree of distinctness; while the many inferences of the other are severally made up of extremely indistinct elements.

412. From which it follows, that the Idealistic deliverance of consciousness cannot be accepted without asserting that things are most certainly known in proportion as they are most faintly perceived.

IX. A CRITERION WANTED.

413. The three short divisions just concluded, have advanced our analysis a stage by disentangling, and presenting separately, the three essential contrasts between the Realistic conception and the conceptions opposed to it.

414. But now we have to enter upon a further stage of our inquiry. It is not enough to be clear that a doctrine is erroneous; it is not enough even to disentangle the error from its disguises; it is further requisite—and in this case above all others requisite—that we should trace down the error to its simplest form and find its root.

415. The argument of the Realist habitually fails from not having as a fulcrum some universally-admitted truth which the Idealist also has to admit. There has to be found some *particular mode* of consciousness which is trustworthy in comparison with all other modes.

416. There must be somewhere, in some shape, some fundamental act of thought by which the validities of other acts of thought are to be determined. Unaided internal perception can no more suffice to build up subjective science than unaided external perception can suffice to build up objective science. In the one case, as in the other, some

mode of verifying our empirical generalizations must be found, before any sure results can be reached.

417. In every case, by every school, something has to be assumed. A certainty greater than that which any reasoning can yield, has to be recognized at the outset of all reasoning—be it the reasoning which proposes to show that necessary truths are *a priori*, or be it the reasoning which proposes to show that necessary truths are products of experience.

418. How imperative is the recognition of an ultimate test of truth, may be gathered from the fact that Philosophy, if it does not avowedly stand on some datum underlying reason, must acknowledge that it has nothing on which to stand—must confess itself to be baseless.

419. Let us consider where this test is to be found, what it is, and how to apply it.

X. PROPOSITIONS QUALITATIVELY DISTINGUISHED.

420. Everywhere exact results are reached only by comparing things of the same denomination; and where the things to be compared are of different denominations, one of them must be reduced to the same with the other, or else the equivalent of each in a denomination different from either must be found. This method we have now to apply.

421. Propositions are the units of composition out of which Realism and Idealism are alike framed; and if Realism and Idealism are to be rigorously compared in respect of their validities, we must first compare their respective units of composition. What qualitative differences, if any, exist between the propositions out of which these conflicting systems are composed?

422. Of the many possible classifications of propositions, only two essentially concern us here; and of these we may first take the one dividing them into the simple and the complex. Into those propositions which tacitly assert little

more than they avowedly assert, as "I have a pain." And those in which what is tacitly asserted immensely exceeds in amount what is avowedly asserted, as when, on seeing a seated figure before me, I say "There is an old man." That conclusions may be compared with scientific rigour, we must not only resolve arguments into their constituent propositions, but must resolve each complex proposition into the simpler propositions composing it. And only when each of these simple propositions has been separately tested, can the complex proposition made up of them be regarded as having approximately a validity equal with that of a simple proposition which has been tested.

423. It remains further to classify propositions according as their terms are real or ideal, or partly one and partly the other. As every proposition expresses some relation between some two terms, we must use the same word—*cognition*—in all cases to express the mental act by which the relation is known. When the content of a proposition is the relation between two terms both of which are directly presented, as when I pinch my finger and am simultaneously conscious of the pain and of the place where it is, we have a simple *presentative cognition*. If I remember that my finger was pinched—deal with faint terms instead of vivid—a simple *representative cognition*. If when pinched I see that the thing pinching me is a vice, the content of the proposition is that along with certain presented appearances, there go the characters which make up my conception of a vice, all of which being represented, the cognition is a *presentative-representative* one. If I afterwards, when not seeing it, say that that which pinched me was a vice, the content of the proposition is in part *representative* and in part *re-representative*: the visual impression I represent, and the accompanying attributes which I think of as going along with the visual impression, I re-represent. Cognitions, as they thus pass into the representative and re-representative, become *constructively* compound—each term becomes one in which are included many tacitly asserted propositions.

From this stage we pass to another in which the cognitions also become *cumulatively* compound.

424. We come now to a broad distinction among propositions. There are some the predicates of which always exist along with their subjects: they express cognitions such that the thing alleged continues before consciousness as long as the thing of which it is alleged continues before consciousness. And there are others of which the predicates do not always exist along with their subjects: they express cognitions such that the thing alleged may disappear from consciousness while the thing of which it is alleged remains.

425. Passing over the latter class, as not here concerning us, we find in the first class two distinct orders. There are cognitions in which the coexistence of the two terms is but *temporarily* absolute. These are the simple cognitions of the presentative order. Suppose I gaze at the Sun. The proposition—"I perceive light," then becomes one in which, along with the subject (self), there invariably exists the predicate (sensation of light). In the other order, the union of subject and predicate is *permanently* absolute. As in the axioms of Mathematics, and the most abstract cognitions of Logic. One important distinction among these sub-classes remains to be noticed. In the *simplest* proposition the connexion of the predicate with its subject is so close that its coexistence cannot be kept out of consciousness; whereas in the more complex of them the invariably-coexistent thing predicated has to be sought for in consciousness. How do we ascertain the invariable existence of predicates along with their subjects? To this question let us now address ourselves.

XI. THE UNIVERSAL POSTULATE.

426. If, having touched a body in the dark, and having become instantly conscious of some extension as accompanying the resistance, I wish to decide whether the proposition

—"Whatever resists has extension," expresses a cognition of the highest certainty, how do I do it? I endeavour to think away the extension from the resistance. I think of resistance, and endeavour to keep extension out of thought. I fail absolutely in the attempt. I cannot conceive the negation of the proposition that whatever resists is extended; and *my failure to conceive the negation*, is the discovery that along with the subject (something resisting) *there invariably exists* the predicate (extension). Hence the inconceivableness of its negation is that which shows a cognition to possess the highest rank. Why is this not universally admitted?

427. Before proceeding let the word inconceivable be distinguished from incredible or unbelievable. An inconceivable proposition is one of which the terms cannot, by any effort, be brought before consciousness in that relation which the proposition asserts between them. An incredible, or unbelievable, proposition, is one which admits of being framed in thought, but not without effort. Thus, it is unbelievable that a cannon-ball fired from England should reach America; but it is not inconceivable. Conversely, it is inconceivable that one side of a triangle is equal to the sum of the other two sides—not simply unbelievable or incredible.

428. A leading objection made by J. S. Mill to the test of the inconceivableness of its negation, as a test whereby an unquestionably-true proposition may be discriminated, is that propositions once accepted as true because they withstood this test, have since been proved false. As the belief in the antipodes. To this criticism, the reply is that the propositions erroneously accepted because they seemed to withstand the test, were complex propositions to which the test is inapplicable; and that no errors arising from its illegitimate application can be held to tell against its legitimate application.

429. In alleging that if a belief is said by some to be necessary, but by others to be not necessary, the test of

necessity is thereby shown to be no test, J. S. Mill tacitly assumes that all men have adequate powers of introspection. Whereas, many are incapable of correctly interpreting consciousness in any but its simplest modes, and even the remainder are liable to mistake for dicta of consciousness what prove on closer examination not to be its dicta.

430. The inconceivableness of its negation affords a far higher warrant for a cognition than does any enumeration of experiences, for the reason that it represents experiences almost infinitely numerous in comparison. If nervous modifications produced by often-repeated nervous acts are inheritable, accumulate from generation to generation, and result in nervous structures that are fixed in proportion as the outer relations to which they answer are fixed, then the test has a worth immeasurably transcending the worth of any test furnished by individual experiences. Space relations have been the same not only for all ancestral men, all ancestral primates, all ancestral orders of mammalia, but for all simpler orders of creatures. Hence it follows that objective necessities of relation in space, are represented by established nervous structures implying latent subjective necessities of nervous action; that these last constitute predetermined forms of thought produced by the moulding of Thought upon Things; and that the impossibility of inverting them, implied by the inconceivableness of their negations, is a reason for accepting them as true, which immeasurably transcends in value any other reason that can be given.

431. It would seem, however, that J. S. Mill really does admit the test of the inconceivableness of the negation to be valid, when he admits, as he does, the test of the *reductio ad absurdum* to be valid. For reduction to an absurdity is reduction to an inconceivable proposition.

432. Sir. W. Hamilton, in proof that inconceivability is no criterion of impossibility, says that Space cannot have a limit, because a limit is inconceivable, and yet that it must have a limit, because unlimited Space is incon-

ceivable—proves, therefore, that Space has a limit and has no limit, which is absurd. Absurd, because "it is impossible for the same thing to be and not to be." But how do we *know* that it is impossible for the same thing to be and not to be, except by its inconceivability?

433. Finally, let it be noted, that anyone declining to recognize the Universal Postulate, can consistently do this only so long as he maintains the attitude of pure and simple negation. The moment he asserts anything—the moment he even gives a reason for his denial, he may be stopped by demanding his warrant. He cannot even take a step towards justifying his scepticism respecting the Universal Postulate without, in the very act, confessing his acceptance of it.

XII. THE TEST OF RELATIVE VALIDITY.

434. We are now prepared to formulate a method of deciding between conflicting conclusions. The relative validities of involved propositions cannot be directly known; but the simple propositions they severally contain must be separated before, by putting these side by side with antagonist ones of equal simplicity, any judgment can be formed. This holds alike where the cognition is simultaneously complex, serially complex, or still more where it is both simultaneously and serially complex.

435. If the postulate be uniformly valid, it must yet happen that, being liable to mental *lapsus*, we shall occasionally think we have its warrant when we have it not; and in each case the chances of our having done this will vary directly as the number of times we have claimed its warrant.

436. It is not from the constitution of the warrant itself that mistake is to be apprehended; but from that inattentiveness which leads us to suppose that we have the warrant when we have it not. Indeed, it needs but to recall the treatises written on fallacies, to be impressed with the fact

that, apart from any possible error in logical principles themselves, error is frequently made, even by the most careful, in the application of them; and that the probability of error consequently increases as the length of an argument increases.

437. Do we not here then discern a rigorous test of the relative validities of conflicting conclusions? Not only as judged instinctively, but as judged by a fundamental logic, *that must be the most certain conclusion which involves the postulate the fewest times.*

XIII. ITS COROLLARIES.

438. From this critical examination of the processes by which conflicting judgments are appraised, we return now to the judgments especially concerning us—those of metaphysicians. Let the reader clear his mind of all hypotheses, and contemplate an object—this book, for instance. So long as he refuses to translate the facts into any hypothesis, he feels simply conscious of the book, and not of an impression of the book—of an objective thing, and not of a subjective thing. Hence, while he continues looking at the book, his belief in it as an external reality possesses the highest validity possible. It has the direct guarantee of the Universal Postulate, which it assumes *only once.*

439. When engaged in interpreting the related impressions which an object yields, and identifying the object as such or such, it is not possible for consciousness to be also engaged in contemplating those impressions as affections of self, still less in contemplating the various other affections which make up self-consciousness. The presented impressions, bound up in a plexus of relations with one another and with represented impressions; and also bound up with those space-relations which constitute the knowledges of externality and position; form a consolidated consciousness, the components of which are for the time inseparable.

440. Since each of the many assumptions which Hypo-

thetical Realism, and the derivative hypotheses of Idealism, Absolute Idealism, and Scepticism, are obliged to make, has but at best the same warrant as the single assumption of Positive Realism. It follows, from the multiplied possibilities of error, that the conclusion reached by the former must be far less certain than that reached by the latter.

441. Finding that any hypothetical doubtfulness of the Realistic conception must be immeasurably exceeded by the resulting doubtfulness of every anti-Realistic argument, we find that Realism is negatively justified.

XIV. POSITIVE JUSTIFICATION OF REALISM.

442. Realism will be positively justified, if it is shown to be a dictum of consciousness working after its proper laws. When normal acts of thought, like those which establish the truths we hold most certain, are proved to be the acts of thought which yield the antithesis of Subject and Object, no further demonstration can be asked.

443. Hence we have to trace the processes by which the Realistic conception is built up. Its relative validity we have already seen to be immeasurably greater than any counter conception; and now we have to test its absolute validity. Its absolute validity will be shown if we find it to be a necessary product of thought proceeding in accordance with laws of thought that are universal.

444. Our analysis and subsequent synthesis will be psychological rather than logical. We must here examine the fabric of consciousness itself to ascertain in what way its components are united.

XV. THE DYNAMICS OF CONSCIOUSNESS.

445. When thought is carried on with precision, thinking a proposition consists in the occurrence together in consciousness of the subject and predicate. In many cases these states of consciousness cannot be separated at all.

Motion cannot be thought of without an object that moves being at the same time thought of. These propositions, in which the connexions in consciousness remain absolute under all circumstances, are distinguished as necessary.

446. A discussion in consciousness is a systematized struggle serving to determine which are the least coherent states of consciousness. And the result of the struggle is, that the least coherent states of consciousness separate, while the most coherent remain together: forming a proposition of which the predicate persists in the mind along with its subject.

447. What corollary must the inquirer draw on pushing the analysis to its limit? If there are any indissoluble connexions, he is compelled to accept them. If certain states of consciousness absolutely cohere in certain ways, he is obliged to think them in those ways.

448. Here, then, is an all-sufficient warrant for the assertion of objective existence. Mysterious as seems the consciousness of something which is yet out of consciousness, the inquirer finds that he alleges the reality of this something in virtue of the ultimate law—he is obliged to think it.

449. But while it is impossible by reasoning either to verify or to falsify this deliverance of consciousness, it is possible to account for it. Let us therefore examine the cohesions among the elements of consciousness, taken as a whole; and observe whether there are any absolute cohesions by which its elements are aggregated into two antithetical halves, standing respectively for Subject and Object.

XVI. PARTIAL DIFFERENTIATION OF SUBJECT AND OBJECT.

450. States of consciousness, which I name touches and pressures, come to me as I sit on this bench with the sea-breeze blowing in my face. After that whiff of seaweed smell, come thoughts of what happened when I first saw the

sea. Excluding all theory as to their origins, these two classes of states are respectively vivid and faint.

451. Comparison shows that the vivid states are original and the faint states derived. It is true that these derivative states admit of being combined in ways not wholly like the ways in which the original states were combined. But without the vivid presentations, no faint re-combinations of them are possible.

452. The vivid originals and the faint copies are contrasted as being, the one absolutely unalterable while I remain physically passive, and the other readily alterable while I remain physically passive.

453. Each set of states is itself a persistent whole. The vivid set is present to me as made up of states rigidly bound in simultaneous order; bound also beyond my control in successive order. And the faint set is made up of states bound together in a pliable rather than a rigid way: the pliability being such, however, that while minor displacements are easy, no total displacement constituting a break is possible.

454. The two aggregates thus contrasted are not coherent in like manner with one another. They move on side by side with an independence that is absolute in the case of the vivid aggregate, while in the case of the faint it is partial and sometimes nearly complete.

455. The two aggregates present the additional trait of separateness that each has its own laws of coexistence and succession. Among the vivid states, there are not only certain general absolute uniformities of relation, but each particular relation when it occurs is absolute. The particular relations in the faint series are, when they occur, not absolute, but may be changed with facility.

456. A further distinction between the two aggregates is, that whereas in the one the antecedent to any consequent may or may not be within the limits of consciousness, in the other it is always within the limits of consciousness.

457. It results that the aggregate of the faint states is a whole mostly very familiar, the limits of which have at one time or other been everywhere visited; while the other is part of a whole which has no discoverable limits.

458. The two aggregates are in fact marked off from one another by traits which, severally striking as they are, constitute when taken together a difference transcending all other differences; for no one member of either aggregate is distinguished from other members of the same aggregate, by traits so many and so strong.

459. When dealing with the "Associability of Feelings" and the "Associability of Relations between Feelings," it became manifest that in the act of cognition each feeling aggregates primarily with the great class it belongs to—falling more or less promptly into its particular order, genus, species, variety; that the like happens with relations between feelings; and that Intelligence is made possible only by such classings. Here, it remains to add, that at the same time each feeling, and each relation, in being known, joins itself to one or other of these two great aggregates.

XVII. COMPLETED DIFFERENTIATION OF SUBJECT AND OBJECT.

460. On continuing, as I sit, the analysis which has disclosed the broad contrast just set forth, I observe certain states not included in either of the aggregates. The seaweed smell, when it brought back memories of places and persons, brought back also a phase of what I call emotion. Though there are both vivid and faint emotions—actual emotions and the ideas of them—they all belong to the faint aggregate.

461. These peculiar members of the faint aggregate have a general character of great significance—they tend to set up changes in a certain combination belonging to the vivid aggregate. The emotions initiate what are known as bodily movements. In some way or other, there is attached to the

faint aggregate a particular portion of the vivid aggregate; and this is unlike all the rest, as being a portion always present, as having a special coherence among its components, as having known limits, as having comparatively-restricted and well-known combinations subject to familiar laws, and especially as having in the faint aggregate the antecedents of its most conspicuous changes.

462. Thus the totality of my consciousness is divisible into a faint aggregate—my mind; a special part of the vivid aggregate cohering with this in various ways—my body; and the rest of the vivid aggregate, which has no such coherence with the faint aggregate. In consequence of its intermediate position, I find myself now regarding my body as belonging to the vivid aggregate, and now as belonging to the same whole with the faint aggregate, to which it is so intimately related.

463. Experience shows me that like effects are producible by antecedents existing respectively in these two great antithetical aggregates; and therefore suggests that there must be something in common between these antecedents. Or, to express the fact simply as a fact of cohesion, I find that as to feelings of touch, pressure, and pain, when self-produced, there cohere those states in my consciousness which were their antecedents; it happens that when they are not self-produced, there cohere with them in my consciousness the faint forms of such antecedents—nascent thoughts of some energy akin to that which I used myself.

464. It follows from this, that I cannot by any possibility exclude the consciousness of a force in the vivid aggregate somehow allied to that which I distinguish as force in the faint aggregate—cannot break the link which association has produced between these states of consciousness.

465. The general result is that the vivid aggregate, both as manifesting passive resistance and as manifesting active energy, inevitably comes to have associated with it in consciousness, the idea of power, separate from, but in some

way akin to, the power which the faint aggregate perpetually evolves within itself.

XVIII. DEVELOPED CONCEPTION OF THE OBJECT.

466. We have seen that the impression of resistance "is the primordial, the universal, the ever-present constituent of consciousness" (*Psychology*, § 347). Hence, along with the segregation of our states of consciousness into vivid and faint, the consciousness of something which resists comes to be the general symbol for that independent existence implied by the vivid aggregate.

467. One other component of co-ordinate importance enters into the conception. That which, to our thought, constitutes a body, is that which permanently binds together those infinitely-varied vivid states the body gives us, as we change our relations to it and as it changes its relations to us: the unvarying *nexus* of the ever-varying cluster of vivid states. The word existence, as applied to the unknown *nexus*, implies this permanence in the midst of that which has no permanence. It expresses nothing beyond this primordial fact in my experience.

468. See, then, how completely there is evolved a conclusion in harmony with our primitive beliefs. The several sets of experiences unite to form a conception of something beyond consciousness which is absolutely independent of consciousness; which possesses power, if not like that in consciousness yet equivalent to it; and which remains fixed in the midst of changing appearances. And this conception, uniting independence, permanence, and force, is the conception we have of Matter.

469. Just in the same way that the Object is the unknown permanent *nexus* which is never itself a phenomenon but is that which holds phenomena together; so is the Subject the unknown permanent *nexus* which is never itself a state of consciousness but which holds states of consciousness together. Limiting himself to self-analysis, the Subject can

never learn anything about this *nexus*, further than that it forms part of the *nexus* to that peculiar vivid aggregate he distinguishes as his body. If, however, he makes a vicarious examination, the facts of nervous structure and function as exhibited in other bodies like his own, enable him to see how, for each changing cluster of ideas, there exists a permanent *nexus* which, in a sense, corresponds to the permanent *nexus* holding together the changing cluster of appearances referable to the external body.

470. In the last three divisions here ended, has been found that which we set out to find. The normal processes of thought inevitably originate this inexpressible but indestructible consciousness of existence beyond the limits of consciousness; which is perpetually symbolized by something within its limits.

XIX. TRANSFIGURED REALISM.

471. The foregoing eighteen divisions have set forth the divisions and subdivisions of an argument so extended and elaborate that a brief allusion to the conclusions reached may be advantageous. All results agree. Anti-Realism is betrayed by its assumption, by its language, by its reasonings; it is based on the negations of three cardinal principles of credibility; it tacitly denies an ultimate test of truth, the very questioning of which implies admission of it. And hence Realism is negatively justified. Further, Realism is positively justified by the discovery that the dynamics of consciousness necessitate the Realistic conception. The Realistic conception does not, as Hume puts it, result from a "natural propensity" at variance with the laws of thought; nor is it, as Sir W. Hamilton supposes, a miraculously-inspired belief; but it is an inevitable outcome of the mental process gone through in every valid argument.

472. This Realism we are committed to is one which simply asserts objective existence as separate from, and

independent of, subjective existence. It affirms neither that any one mode of this objective existence is in reality that which it seems, nor that the connexions among its modes are objectively what they seem. 'Thus it stands widely distinguished from Crude Realism; and to mark this distinction it may properly be called Transfigured Realism.

473. The image of a cube in a curved reflector may help us to see how Transfigured Realism reconciles what appear to be irreconcilable views. It was lately shown that existence, in the accepted sense of the word, can be affirmed only of that variously-conditioned substratum called the Object, and that other substratum variously acted on by it, called the Subject; while the effects of the one on the other, known as perceptions, are changes having but transitory existences. In our illustration, the permanent existences are the cube and the surface; while the projected image, varying with every change in the relation between the cube and the surface, has no permanent existence. And just as we saw that Subject and Object, as actually existing, can never be contained in the consciousness produced by the co-operation of the two, though they are necessarily implied by it; so we see that neither the cube nor the surface can ever be contained in the projected image of the one upon the other, though this projected image can exist only on condition that they pre-exist.

474. And now the impossibility of all Anti-Realistic beliefs having been shown, we must not forget that these complicated aberrations of reason have been the concomitants of a legitimate, and indeed necessary, criticism. The history of metaphysical controversy has been a history of those rhythms which antagonistic forces always produce—now causing excess on this side and now on that. But as fast as the differentiation of Subject and Object approaches completion, the oscillations become less and less; and along with the purification of Realism from all that does not belong to it, the controversy ends: Realism contenting itself with

affirming that the object of cognition is an independent existence, and Anti-Realism having shown that the cognition of it is entirely relative.

475. Once more, then, we are brought to the conclusion reached by other routes, that behind all manifestations, inner and outer, there is a Power manifested. Here, as before, it has become clear that while the nature of this Power cannot be known, yet its universal presence is the absolute fact without which there can be no relative facts.

CHAPTER XVI.

CONGRUITIES.

I. PRELIMINARY.

475*a*. The seven foregoing chapters have dealt with different aspects of psychological phenomena, and it remains now to co-ordinate these different aspects. Standing apart as they do, they may to some appear unconnected, and to others they may appear incongruous. It will be the aim of this chapter to show their congruity.

II. CO-ORDINATION OF DATA AND INDUCTIONS.

475*b*. In the "Data of Psychology," after treating of the structure and functions of the nervous system, we found the implication to be that, though immediate proof was impossible, the nervous structures which connect and combine what, under their objective aspects, are nervous changes, connect and combine what, under their subjective aspects, are states of consciousness.

475*c*. In the "Inductions of Psychology" we saw that the substance of Mind in its ultimate nature is inscrutable; that feelings are compounded of that primordial unit—the nervous shock; and that the composition of Mind, as actually observable, consists of feelings and relations between feelings: each with their varying degrees of relativity, revivability, and associability.

475*d*. Between the Data and the Inductions the congruities are many and complete. The hypothesis that feeling

of whatever order consists of variously-compounded units of feeling similar in kind is congruous with the established fact that every nervous discharge is a series of pulses of molecular change. The conclusion that while the changes produced in nerve-centres correspond to feelings, the discharges through nerve fibres correspond to the relations between feelings, harmonizes with the fact that these lines of communication through which relations are established, are most numerous in those parts where the greatest number of separate feelings are initiated and combined. The closeness of connexion between parts of the nervous system, and resulting closeness of connexion between nervous actions, go along with readiness in the corresponding mental states to form connexions. If, various as are the stimuli producing them, the nervous discharges are essentially similar; it is inconceivable that in the nerve-centres affected by them, they should be severally re-translated into the several special forces producing them. The phenomena of vivid and faint feelings, and the connexions among them, again correspond to certain phenomena of nervous action. And, lastly, that feelings exclude one another from consciousness in different ways and degrees, obviously corresponds with the facts of nervous structure.

III. CO-ORDINATION OF SYNTHESES.

475*e*. In the "General Synthesis" the conception of mental evolution was that of inner related actions that progress in correspondence to outer related actions throughout an ever-widening environment. The succeeding "Special Synthesis," had for its purpose to interpret this progressing correspondence between inner and outer actions, in the terms commonly used when speaking of mental phenomena. In the "Physical Synthesis" we proceeded to inquire after what physical principle the nervous system has had its structure and functions adapted to the requirements. The harmony among these synthetical chapters is con-

spicuous: the conclusions reached in the second and third, being successively more developed forms of the conclusions reached in the first.

475*f*. That these conclusions are congruous with those contained in the Data and Inductions will be manifest on comparing them. An obvious agreement exists between the developing structure of the nervous system, and that increase of the correspondence in heterogeneity, in space, in time, in speciality, in complexity, set forth in the "General Synthesis." Similarly, the truths which the Data and Inductions set forth agree with the conclusions drawn in the "Physical Synthesis:" for, as was implied at the time, the latter is a deductive interpretation of the truths previously established by induction.

IV. CO-ORDINATION OF SPECIAL ANALYSES.

475*g*. In the "Special Analysis" was disclosed a fundamental unity of composition throughout all the phenomena of intelligence. And we saw that since consciousness can exist only by ceaseless change from each state to a different state; and since its states and changes can be arranged in order only by the classing of like with like, that "all mental action whatever is therefore definable as *the continuous differentiation and integration of states of consciousness.*" In which ultimate character of psychical life we recognized a parallelism to an ultimate character of physical life.

475*h*. That these conclusions are congruous with the conclusions reached in the synthetical chapters, will be manifest to every reader who remembers what those conclusions were. The conception of Life itself, as the continuous adjustment of inner relations to outer relations, introduces us to an entire agreement between the general aspect of mental phenomena as objectively considered, and the general aspect of mental phenomena as subjectively considered. On reconsidering the natures of our perceptions of external things, as disclosed in the "Special Analysis," it will be seen that

for their essential traits, explanations are supplied by the traits of nervous structure and function. Such components in these perceptions as are invariable, or are repeated in every case, are indissolubly associated in thought: are associated in such a way as would result from a reflex action established by innumerable repetitions. Most striking and instructive, however, is the correspondence existing between the facts of nervous structure and function, and the interpretation which was given of our consciousness of space. Not only is there entire congruity between the special results synthetically reached and those reached by analysis, but each elucidates the other.

V. CO-ORDINATION OF GENERAL ANALYSES.

475*i*. The inquiries carried on in the chapters abstracted in the foregoing four divisions, assumed the coexistence and co-operation of subject and object. Avowedly made as provisional at the outset of *First Principles*, and there justified only by a brief survey of the reasons for making it, this assumption was returned to in the "General Analysis" for the purpose of finally justifying it. Reverting to the inference originally reached, that justification for this ultimate dictum of consciousness must consist in proof of its congruity with all other dicta, we proceeded to set forth the proof.

475*j*. That the Realism which emerged from the examination of the way in which our states of consciousness hang together, is congruous with the Realism postulated throughout the preceding seven chapters scarcely needs saying. The leading truths taught concerning the structure and functions of the nervous system, and concerning the nature and development of intelligence, receive crowning illustrations in the formation of this indestructible consciousness in which Realism abides. The belief in an external world is the outcome of reflex intellectual actions established, like all those others which entail forms of thought, during that

moulding of the organism to the environment which has been going on through countless millions of years.

VI. FINAL COMPARISON.

475*k*. Metaphysical opponents will perhaps deny the proposition that the aggregate of ideas and feelings composing consciousness, either forms the totality of existence, or it does not. Nevertheless, we will assume, as the only possible alternatives, that there is existence beyond consciousness, or that there is no existence beyond consciousness.

475*l*. If there is no existence beyond consciousness—if there is no other being either of the same kind or of another kind; then consciousness, eternally existing, is at once creator and created. It always has been, is, and will be, the sum of all causes and effects, omnipotent and omnipresent. Under such conditions, the question of objective existence as distinguished from subjective existence is rigorously excluded. The metaphysical problem cannot even be entertained.

475*m*. Taking the alternative, that there is existence beyond consciousness, the conclusions reached are inevitable. For if it be said that an effect wrought by the one on the other is not like its cause in the other, it is simultaneously said that there is a cause in the other. If it be said that no connexion between the effects in the one can be like the connexion between the causes in the other, it is simultaneously said that there is a connexion between the causes in the other. That is to say, while to the inner existence the outer existence is represented by its effects, but cannot be presented in its nature; yet the representation of it by its effects, necessarily implies its coexistence.

475*n*. Of the two alternatives, then, the last is in all ways congruous with other deliverances of consciousness, and the first incongruous with them. Thus we are brought again, by another route, to the doctrine of Transfigured

Realism. Examination shows that, while the opposed doctrines are consistent neither within themselves nor with other beliefs, this doctrine is internally consistent, and consistent externally with our beliefs at large.

475*o*. As already shown, the conception of Mind as consisting, in common with Life at large, of definitely combined heterogeneous changes in correspondence with external coexistences and sequences, necessarily posits the relation of subject and object. And the reasoning used to show that the nervous system, and therefore the consciousness accompanying its actions, is evolved through the converse of organism and environment, cannot be carried on without assuming organism and environment. Thus, the doctrine of Transfigured Realism, which is but another aspect of the doctrine of the Unknowable, harmonizes with the results of both syntheses and analyses; since, while they imply that inner thoughts answer to outer things, in such wise that cohesions in the one correspond to persistences in the other, they do not imply that the correspondence is anything more than symbolic.

475*p*. Transfigured Realism, asserting an impassable limit between object and subject, recognizes an external independent existence which is the cause of changes in consciousness, while the effects it works in consciousness constitute the perception of it; and it infers that the knowledge constituted by these effects cannot be a knowledge of that which causes them, but can only imply its existence. May it not, then, be said that in thus interpreting itself, subjective existence makes definite that differentiation from objective existence, which has been going on from the beginning of mental evolution?

CHAPTER XVII.

COROLLARIES.

"Consisting in part of a number of derivative principles which form a necessary introduction to Sociology."

I. SPECIAL PSYCHOLOGY.

476. The field of General Psychology having been explored, there opens before us the far more extensive field of Special Psychology.

477. Of the vast field of research included within these bounds, we need here examine but a small part—the special psychology of man, considered as the unit of which societies are composed.

478. Our aim will be to summarize those human faculties which take part as factors in social phenomena.

II. CLASSIFICATION.

479. Though classification of the special mental faculties is difficult, and can be effected only in a vague way, there is nevertheless a mode of classification which harmonizes with the results of both analysis and synthesis; and one which is indirectly implied by the doctrine of Evolution. It is by grouping the higher mental faculties according as they are removed in the first, second, third, &c., degree from those simple sense-faculties which are the roots common to them all.

480. In the "Composition of Mind" we saw that the primary division of mental elements is into FEELINGS, and the

RELATIONS BETWEEN FEELINGS (commonly called COGNITIONS). COGNITIONS are divisible into four great sub-classes. *Presentative Cognitions;* or those in which consciousness is occupied in localizing a sensation impressed on the organism: as on cutting one's finger. *Presentative-representative Cognitions;* or those in which consciousness is occupied with the relation between a sensation, or group of sensations, and the representations of those various other sensations that accompany it in experience: what we commonly call perception. As when its visible form and colour, lead us to mentally endow an orange with all its other attributes. *Representative Cognitions;* or those in which consciousness is occupied with the relations among ideas, or represented sensations; as in all acts of recollection. *Re-representative Cognitions;* or those in which the occupation of consciousness is not by representations of special relations, that have before been presented to consciousness; but those in which such represented special relations are thought of merely as comprehended in a general relation. The ideas resulting from this abstraction, do not themselves represent actual experiences; but are symbols which stand for groups of such actual experiences—represent aggregates of representations. FEELINGS are divisible into four parallel sub-classes. *Presentative Feelings;* ordinarily called sensations, as when we contemplate a corporeal impression in itself as pleasure or pain: as when inhaling a perfume. *Presentative-representative Feelings;* embracing a great part of what we commonly call emotions, are those in which a sensation, or group of sensations, or group of sensations and ideas, arouses a vast aggregation of represented sensations; partly of individual experience, but chiefly deeper than individual experience, and, consequently, indefinite. The emotion of terror may serve as an example. *Representative Feelings;* comprehending the ideas of the feelings above classed, when they are called up apart from the appropriate external excitements. Instances of these are the feelings with which the descriptive poet writes, and which are aroused in the minds of his readers. *Re-*

representative Feelings; those more complex sentient states that are less the direct results of external excitements than the indirect or reflex results of them. The love of property, and the sentiment of justice, are feelings of this kind. These groups are of course but indefinitely distinguishable. Why is this classification according to degree of representativeness, especially adapted for our present purpose?

481. In the first place, it answers as a measure of Evolution, considered under its widest aspects. Increasing integration, increasing definiteness, and increasing heterogeneity of composition are alike measured by the extent to which representation and re-representation have been carried.

482. Secondly, it measures degree of mental evolution. For the growth of perception involves representation of sensations; the growth of simple reasoning involves representation of perceptions; and the growth of complex reasoning involves representation of the results of simple reasoning. So that the remoteness from sensation necessarily increases with the intellectual elevation. And if the genesis of the emotions has been as described, then, obviously, the steps have been from simple sensations to sensations combined with represented sensations, then to represented sensations organized into groups, and then to representations of these representative groups.

483. Degree of representativeness will, then, be our standard of degree of evolution. Let us now measure the leading traits of intellectual development, as it affects, and is affected by, civilization. We will subsequently deal with the accompanying emotional development.

III. DEVELOPMENT OF CONCEPTIONS.

484. In the course of human progress general ideas can arise only as fast as social conditions render experiences more multitudinous and varied; while at the same time it is to be observed that these social conditions themselves presuppose some general ideas.

485. Small power of representation implies inability to recognize processes that are slow in completing themselves: *long sequences* are unperceived. The lowest men have no means of reckoning sequences longer than those of the seasons. Hence it inevitably happens that the primitive man has but little *foresight;* and shows no tendency to provide for remote contingencies.

486. Experiences made ever more numerous, varied, heterogeneous, and involved, as by degrees civilization supplies them and develops the faculties for appreciating them, tend ever to widen the possibilities of thought and diminish the rigidity of belief: *modifiability of belief* increases.

487. Along with the relative simplicity, poverty, and rigidity, which characterize primitive thought, there goes a relative limitation to concrete conceptions: *abstract conceptions* are impossible. Only after many special causes have been separated in thought from the classes of actions exemplifying them, can there be formed any notion of cause in general.

488. Experiences such as those received by the primitive man, furnish but few data for the conception of *uniformity;* whether as displayed in things or in relations. Thus the belief in an unchanging order—the belief in *law*, now spreading among the more cultivated throughout the civilized world, is a belief of which the primitive man is absolutely incapable. He is unable to think even of a single law, much less of law in general.

489. Progress in *exactness* of thought is one of the concomitants of increasing representativeness. Primitively, there can exist neither the habit of expressing things definitely, nor the habit of testing assertions, nor a due sense of the contrast between fact and fiction.

490. Credulity is an inevitable concomitant of this primitive mental state: *scepticism* and *criticism* cannot become habitual. Such notions can be evolved only *pari passu* with the evolution of the notions just mentioned.

491. That in the lower stages of mental evolution *imagi-*

nation is feeble, and that it strengthens with each increment of intellectual progress, has been already said in saying that each increment of intellectual progress implies an increase in representativeness of thought. The mental evolution which accompanies civilization, makes imagination more vivid, more exact, more comprehensive, and more excursive.

492. A distinction of considerable moment remains to be added—that existing between *reminiscent imagination* and *constructive imagination*. From the former, which is an earlier and less-developed faculty, we pass in the most civilized to the latter—or rather, in a scattered few of the most civilized. Constructive imagination is the highest intellectual faculty, and underlies every high order of intellectual achievement.

493. The intellectual traits of primitive man may be seen in the less-cultivated of our own society; and especially in women of the inferior ranks. The united traits distinguishing them are—that they quickly form very positive beliefs; that their thoughts, full of personal experiences, lack truths of high generality; that they can never detach an abstract conception expressed to them, from a concrete case; that they are inexact, and even averse to precision; that they go on doing things in the ways they were taught, never imagining better methods, however obvious; and that for them deliberately to weigh evidence is impossible.

IV. LANGUAGE OF THE EMOTIONS.

494. Before sketching the emotional development which accompanies social evolution, we must consider the effects which human beings unconsciously produce on one another's feelings by the physical manifestations that accompany feelings.

495. In studying emotional language we have to recognize two classes of effects—those of the *diffused* nervous discharge, and those of the *restricted*. And this last has to be differentiated into the *undirected* and the *directed*—that

which takes place without motive, and that which is shown in the muscular actions guided by motive.

496. Every feeling has for its primary concomitant a diffused nervous discharge, which excites the muscles at large, including those that move the vocal organs, in a degree proportionate to the strength of the feeling. Consequently muscular activity increasing in amount becomes the natural language of feeling increasing in amount—be the nature of the feeling what it may.

497. The diffused discharge accompanying feeling of any kind, yields an additional indication of its quantity by affecting muscles in the inverse order of their sizes and the weights of the parts to which they are attached. Supposing a feeble wave of nervous excitement to be propagated uniformly throughout the nervous system, the part of it discharged on the muscles will show its effects most where the amount of inertia to be overcome is least. Muscles which are large, and which can show states of contraction into which they are thrown only by moving limbs or other heavy masses, will yield no signs; while small muscles attached to easily moved parts, such as the facial, will visibly respond.

498. In passing to the restricted discharges, can we explain the expression of passions in human beings? Though in man there are many sources of non-pleasurable feelings other than antagonism, and though antagonism itself ends in combat only when it rises to an extreme, yet as among inferior ancestral types antagonism is the commonest and most conspicuous accompaniment of non-pleasurable feeling, and continues to be very generally an accompaniment in the human race, there is organically established a relation between non-pleasurable feeling and the muscular actions which antagonism habitually causes. Hence those external concomitants of non-pleasurable feeling which constitute what we call its expression, result from incipient muscular contractions of the kinds accompanying actual combat.

499. The vocal expressions of destructive passion are similarly explicable. A rising tide of feeling, causing in-

creased muscular strain, may adjust the vocal apparatus to tones increasingly higher or increasingly lower—either of these implying muscular strain that is greater as departure from the medium tones is wider. Hence either extreme of pitch is apt to be produced; and often there is a sudden change from the one to the other.

500. Emotional manifestations are often complicated by the restraints which are intentionally put upon the external organs, for the purpose of hiding or disguising the feelings. The secondary feelings prompting this concealment, have a natural language of their own; which in some cases is easily read.

501. One further set of complications, having a widely-different origin, come under a different and almost opposite law. These are secondary effects wrought by feelings on the vascular system, on the consequent supply of blood to the nervous centres, and on the resulting genesis of nervous energy. In many cases they counteract the primary effects above described, and not unfrequently invert them. A very intense feeling may so over-irritate the *vagus* nerve as to arrest the heart's action and cause fainting; or it may cause a general loss of power, as in the prostration of great grief; or it may so affect the vascular system as to be shown by changes of colour—by blushing and growing pale.

502. There is no foundation, then, for the current notion that there are designed arrangements for the expression of feeling. The Hypothesis of Evolution yields us here, as elsewhere, an adequate solution of the facts. Deep down in the nervo-muscular structures, as they have been evolved by converse between the organism and its environment, are to be found the causes of all these manifestations. What has hence resulted during the intercourse of individuals with one another?

V. SOCIALITY AND SYMPATHY.

503. An animal of a predatory kind, which has small and

much scattered prey, profits by living alone. Others having large prey, or food not scattered, profit by co-operation and gregariousness. Hence the truth that sociality, while in some cases negatived by the wants of the species, becomes in other cases naturally established as furthering the preservation of the species.

504. We may safely infer that among creatures led step by step into gregariousness, there will little by little be established a pleasure in being together—a pleasure in the consciousness of one another's presence—a pleasure simpler than, and quite distinct from, those higher ones which it makes possible.

505. The greater safety, and the earlier detection of enemies, resulting from gregariousness, brings us to those mental states produced not only by the *presence* but by the *actions* of others of the same species. The alarmed members of a flock, seen and heard by the rest, excite in the rest the emotion they are displaying; and the rest, prompted by the emotion thus sympathetically excited, begin to make like movements and sounds.

506. Beyond sympathetic fear, there are sympathetic feelings of other kinds established after a kindred manner. Creatures living together are simultaneously affected by surrounding conditions of a favourable kind: are apt to have pleasurable feelings sympathetically excited. Pleasurable excitement spreads amongst horses, as every hunting-field shows.

507. Here we are naturally introduced to the truth that the degree and range of sympathy depend on the clearness and extent of representation. There can be sympathy only in proportion as there is power of representation.

508. When to the general sociality there come to be added the special socialities of a permanent sexual relation, and of a double parental relation, sympathy develops more rapidly. In proportion as these relations are enduring and close, there is an increased number and variety of occasions on which the individuals held in them are affected in com-

mon by the same causes, and show in common the same outward signs; whence it results both that the sympathetic excitations are more frequent, and that they extend to more numerous feelings. The sympathies become the widest and the strongest where the three forms of sociality coexist along with high intelligence, and where there are no conditions which necessitate repression of the sympathies.

509. In the human race we have all three direct causes of sympathy in action, along with the coessential condition —elevated intelligence. During the progress from the lowest up to the highest types yet evolved, sympathy and sociality under its three forms, have been acting and reacting, each as cause and consequence—greater sympathy making possible greater sociality, public and domestic, and greater sociality serving further to cultivate sympathy.

510. In addition to inadequacy of intelligence limiting sympathy, there is a cause of another order which it is important ever to remember. The human race, though a gregarious race, has ever been, and still is, a predatory race. Fellow-feeling has been continually repressed in those directions where social safety has involved the disregard of it; while it has been allowed to grow in those directions where it has conduced to the welfare of the society or has not hindered it.

511. The effect of the predatory activities has been so to specialize the sympathies that they have become comparatively strong where these repressive causes have not acted, and have remained comparatively weak where they have acted. While, however, they have not prevented the development of sympathy in the directions open to it, they have retarded it throughout its entire range. For that indifference to the giving of positive pain to others which they necessitate, goes along with indifference to that negative pain in others which absence of pleasure implies; and is therefore at variance with the sympathetic pleasure obtained by giving pleasure.

512. One general inference may be added. The evolu-

tion of those highest social sentiments which have sympathy for their root, has been all along checked by those activities which the struggle for existence between tribes and between nations has necessitated. Only when the struggle for existence has ceased to go on under the form of war, can these highest social sentiments attain their full development.

VI. EGOISTIC SENTIMENTS.

513. The word Sentiments will be taken to comprehend those highest orders of feelings which are entirely re-representative. They are neither presentative states nor representations of such states; but consist of the multitudinous representations of such representations confusedly massed with one another, and with kindred feelings still more vague, organically associated by ancestral experience.

514. The evolution of the special re-representative feeling or sentiment, which all persons display in liking to visit the scenes of past pleasures, conveniently illustrates the sentiments generated in the individual, in contradistinction to the sentiments generated in the race.

515. If we contrast the life of a primitive man with that of an intelligent inferior animal, we perceive that there is an increase in the variety of objects associated in his experience with enjoyment. Possession is, however, the constant antecedent to each of these various satisfactions. Hence, becoming habitual in respect to objects of various natures, it has, *pari passu*, ceased to be connected in experience with any particular kind of object or satisfaction. The gaining possession has come to be a pleasurable act because it produces a partial excitement of all those past pleasures not individually recallable, but forming a voluminous vague feeling—a feeling that has become a sentiment proper, since it has become re-representative. With progress in civilization, it is needless to add, is reached a higher re-representativeness.

516. Power to use the limbs and senses unimpeded, is associated in individual life with every kind of pleasure; and it is similarly associated in the lives of all ancestry, human and pre-human. The body of the sentiment, therefore, is a vague and voluminous feeling produced by experiences organized and inherited throughout the whole past. In the agitation excited by arrest of motions, there is a multitudinous re-representation of denials of all kinds; while in the joy of liberty regained there are massed together the potentialities of gratifications in general. A re-representativeness yet more elevated, characterizes the sentiment as we pass through ascending gradations of political freedom. This primarily-egoistic sentiment attains its highest form only by the aid of an altruistic sentiment; the co-operation of which will be subsequently indicated.

517. A successful bodily or mental act, while it secures the gratification sought, vaguely revives the consciousness of kindred acts that have been followed by kindred gratifications. Thus successful action in general, comes to be associated in consciousness with pleasure in general: both the two consciousnesses being re-representative. From the tendency that each success has to arouse ideas of one's past successes, rises the sentiment of self-estimation, which, when it rises to a considerable height, is called pride.

518. To pursue this synthesis in other directions would cause too much delay; else something might be said of the modifications and the combinations of these egoistic sentiments.

VII. EGO-ALTRUISTIC SENTIMENTS.

519. Bearing in mind that the effects of experience, as understood in this work, are the effects produced by the occurrence together of nervous states, with their accompanying states of consciousness when these exist; whether the relations between the states are observed or not. We pass now to the ego-altruistic sentiments, or those which, while

implying self-gratification, also imply gratification in others: the representation of this latter being a source of pleasure not intrinsically, but because of ulterior benefits to self which experience associates with it.

520. The emotions given to the young savage by the natural language of love and hate in the members of his tribe, gain first a partial definiteness in respect to his intercourse with his family and playmates; and he learns by experience the utility, in so far as his own ends are concerned, of avoiding courses which call from others manifestations of anger, and of taking courses which will call from them manifestations of pleasure. He has no thought of the goodness or badness of the act itself: the deterrent is the mainly-vague, but partially-definite, fear of evil that may follow. A higher order of restraints is derived from these. The primitive belief that every dead man becomes a spirit, and may return to give aid or do mischief, becomes a strong incentive or deterrent. The consciousness that a powerful chief may reappear and punish those who have disregarded his injunctions, becomes a powerful motive; and it admits of immense development by accumulation of traditions. The deity continues to be thought of as displaying human emotions in human ways. His powers of inflicting punishment and giving happiness become ever greater; so that the dread of divine displeasure and the desire to obtain divine approbation, acquire a certain largeness and generality, while still remaining anthropomorphic. The morality and immorality of actions, as we understand them, are at first unrecognized.

521. Much of what passes as religious sentiment, is thus but a more highly re-representative form of that ego-altruistic sentiment which mainly guides men in their behaviour to one another. Acts are not so far considered, in their intrinsic natures, apart from any consequences to self, immediate or remote.

522. For this reason it is that the standards of right and wrong have been, and still are, so unlike in different socie-

ties. The regulative sentiments of ego-altruistic nature, are, in their relations to concrete action, as variable as are the kinds of conduct conducive to social well-being under different social conditions. Nevertheless, the ego-altruistic sentiments have important compounds that are constant. A kind of conduct which calls forth approval among all races and in all times, will be felt as right, irrespective of the people and the age; and *vice versâ*.

523. That the ego-altruistic sentiments are constituted as alleged, may be seen in the fact that shame, produced by representation of the contempt of others, is the same in its essential nature whether the imagined contempt is excited by a wrong thing really done, or by a wrong thing supposed to be done: a blush is as apt to arise in the innocent child to whom guilt is ascribed as in the actually guilty.

VIII. ALTRUISTIC SENTIMENTS.

524. The variability of sentiment pointed out in the foregoing division, is but the concomitant of the transition from the aboriginal type of society fitted for destructive activities, to the civilized type of society fitted for peaceful activities. The ideas and sentiments must eventually grow uniform and permanent for the reason that the conditions to complete social life are uniform and permanent.

525. Since as a society advances in organization, the interdependence of its parts increases, and the well-being of each is more bound up with the well-being of all, it results that the growth of feelings which find satisfaction in the well-being of all, is the growth of feelings adjusted to a fundamental unchanging condition to social welfare.

526. Why the sympathetic and altruistic feelings produced in each by the expressions of feelings in others, do not develop to so great height as the ego-altruistic, will be manifest on considering that, in addition to the checking of the sympathies which the antagonisms of societies have

necessitated and still necessitate, there has been a checking of them consequent on the struggle for existence within each society. The pleasure of the individual and social well-being have both necessitated the growth of the ego-altruistic feelings.

527. An altruistic feeling becomes re-representative, or a sentiment proper, only when the feeling sympathized with is an emotion—not when it is merely a sensation. The transition to this higher stage, where there are no presentative elements, is gradual.

528. Very much of the feeling ordinarily classed as generosity is ego-altruistic. While much mingled with the lower sentiments, generosity early displays itself slightly and erratically. It becomes marked and frequent only as fast as civilization develops the sympathies.

529. The sentiment of pity is one that takes a considerable development only as fast as diminution of the predatory activities allows. An important truth may here be added. Every altruistic feeling needs the corresponding egoistic feeling as an indispensable factor; since unless a sensation or emotion has been felt, it cannot be sympathetically excited.

530. From these simpler forms, we pass now to a most complex form—the sentiment of justice: it being constituted by representation of a feeling that is itself highly re-representative. The limit towards which this sentiment advances, is that each citizen will be as sympathetically anxious for each other citizen's due sphere of action as for his own.

531. And now mark how erroneous is the belief that evolution of mind by the accumulated and inherited effects of experiences, cannot result in permanent and universal moral sentiments, with their correlative moral principles. While the ego-altruistic sentiments adjust themselves to the various modes of conduct required by social circumstances in each place and age, the altruistic sentiments adjust themselves to the modes of conduct that are permanently beneficial, because conforming to the conditions needful for the

highest welfare of individuals in the associated state. The sacredness of life, of liberty, of property, are more and more vividly felt as civilization advances. Among all the higher races that have long been subject to social discipline, there is approximate agreement on these points, in so far as the intercourse between fellow-citizens is concerned.

532. We come now to a yet more complicated altruistic sentiment—that of mercy. The state of consciousness thus named, is one in which the execution of an act prompted by the sentiment of justice, is prevented by an out-balancing pity—by a representation of the suffering to be inflicted. Here we have two altruistic sentiments in antagonism; and it is interesting to observe how, occasionally, there arises a painful hesitation between their two dictates, each of which would seem morally imperative in the absence of the other. The anxiety to avoid giving pain prompts one course; and an opposite course is prompted by the sentiment responding to those supreme principles of equity which cannot be relaxed without danger.

IX. ÆSTHETIC SENTIMENTS.

533. The activities we call play are united with the æsthetic activities, by the trait that neither subserve, in any direct way, the processes conducive to life. Whence arises the play-impulse? And how comes that supplementary activity of the higher faculties which the Fine Arts imply?

534. As we ascend to animals of high types we find that time and strength are not wholly absorbed in providing for immediate needs. Now, every one of the mental powers being subject to the law that its organ, when dormant for an interval longer than ordinary, becomes unusually ready to act, it happens that a simulation of its activities is easily fallen into, when circumstances offer it in place of the real activities. Hence play of all kinds—hence the tendency to superfluous and useless exercise of faculties that have been quiescent. Hence, too, the fact that these

uncalled-for exertions are most displayed by those faculties which take the most prominent parts in the creature's life.

535. The general nature and position of the æsthetic sentiments will be made more clearly comprehensible by observing how the æsthetic character of a feeling is habitually associated with separateness from life-serving function. In scarcely any degree do we ascribe the æsthetic character to sensations of taste. These gratifications are but rarely separated from the life-serving functions. While, conversely, there arises a wide scope for pleasures derivable from superfluous actions of the auditory faculty, which are much dissociated from life-serving functions. That the æsthetic consciousness is essentially one in which the actions themselves, apart from ends, form the object-matter, is shown by the conspicuous fact that many æsthetic feelings arise from contemplation of the attributes and deeds of other persons, real or ideal.

536. The primitive source of æsthetic pleasure in simple sensations, is that character in the combination which makes it such as to exercise the faculties affected in the most complete ways, with the fewest drawbacks from excess of exercise. Joined to this, comes a secondary source of pleasure—the diffusion of a normal stimulus in large amount, awaking a glow of agreeable feeling, faint and undefinable. And a third source of pleasure is the partial revival by this discharge of the various special gratifications connected in experience with combinations of the kind presented.

537. The same general and special truths hold in the combinations of sensations that awaken ideas and feelings of beauty. Movements of the body pleasurable to self, and associated with the consciousness of gracefulness (as in skating), are movements of a kind that bring many muscles into moderate harmonious action and strain none. There are reasons for suspecting that beautiful arrangements of forms, are those which effectually exercise the largest num-

bers of the structural elements concerned in perception, while overtaxing the fewest of them. Similarly with the complex visual wholes presented by actual objects, or by pictorial representations of objects, with all their lights and shades and colours.

538. We pass into that higher region where the states of consciousness are exclusively re-representative, in taking count of the remoter mental states aroused by landscape and by music. The feelings of beauty yielded by the literature of the imagination are remotely re-representative.

539. Subject always to the cardinal requirement that the æsthetic feeling is one not immediately aiding any life-serving function, the highest æsthetic feeling is one having the greatest volume, produced by due exercise of the greatest number of powers without undue exercise of any; or is one resulting from the full but not excessive exercise of the most complex emotional faculty. The height of the feeling is proportionate to the remoteness from simple sensation; to its complexity, as containing an immense variety of those elements of which emotions are composed; and as being a faint reproduction of the enormous aggregate of such elements massed together in the course of evolution.

540. Finally, the æsthetic activities in general may be expected to play an increasing part in human life as evolution advances. Greater economization of energy, resulting from superiority of organization, will have in the future effects like those it has had in the past. A growing surplus of energy will bring a growing proportion of the æsthetic activities and gratifications; and while the forms of art will be such as yield pleasurable exercise to the simpler faculties, they will in a greater degree than now appeal to the higher emotions.

PART IV.

"THE PRINCIPLES OF SOCIOLOGY."

CHAPTER XVIII.

THE DATA OF SOCIOLOGY.

"A statement of the several sets of factors entering into social phenomena—human ideas and feelings considered in their necessary order of evolution; surrounding natural conditions; and those ever complicating conditions to which society itself gives origin."

I. SUPER-ORGANIC EVOLUTION.

1. Of the three broadly-distinguished kinds of Evolution outlined in *First Principles*—the Inorganic, the Organic, and the Super-organic—we come now to the third.

2. Super-organic Evolution may be conveniently marked off from the organic, by taking it to include all those processes and products which imply the co-ordinated actions of many individuals.

3. Though the aggregates formed by the social insects —the bees, wasps, and ants—simulate social aggregates in sundry ways; yet they are not true social aggregates. For they are not unions among like individuals independent of one another in parentage, and approximately equal in their capacities; but unions among the offspring of one mother.

4. True rudimentary forms of Super-organic Evolution are displayed only by some of the higher *Vertebrata*, as the rooks, beavers, and sundry of the *Primates*.

5. Henceforth we shall restrict ourselves to that form of Super-organic Evolution which human societies exhibit in their growths, structures, functions, and products, that is, to the phenomena of Sociology.

II. THE FACTORS OF SOCIAL PHENOMENA.

6. Every society, be it rudimentary, or be it advanced, displays phenomena that are ascribable to the characters of its units, and to the conditions under which they exist.

7. Sub-dividing these primary factors, we get the extrinsic factors of climate, surface, Flora, and Fauna. And the intrinsic factors of the physical, emotional, and intellectual traits of the individual man—the social unit.

8. Of the secondary, or derived, factors which social evolution itself brings into play, may be set down the changes of climate caused by the clearing of forests and by drainage; and the effects wrought upon the Flora and Fauna of the surface occupied.

9. Social growth is at once a consequence and cause of social progress. Division of labour cannot be carried far where there are but few to divide the labour.

10. The influences which the society exerts on the natures of its units, and those influences which the units exert on the nature of the society, incessantly co-operate in creating new elements.

11. As societies progress in size and structure, they work profound metamorphoses on one another, now by their war-struggles, and now by their industrial intercourse.

12. The ever-accumulating, ever-complicating super-organic products, material and mental, constitute a further set of factors which become more and more influential causes of change. The potency of these can hardly be over-estimated.

13. Let us now proceed to the original factors. Dealing only with those primary data common to social phenomena in general, and most readily distinguished in the simplest societies.

III. ORIGINAL EXTERNAL FACTORS.

14. A complete outline of the original external factors

implies a knowledge of the past which we have not, and are not likely to have. During all past time geological and meteorological changes, as well as the consequent changes of Floras and Faunas, must have been causing perpetual emigrations and immigrations over all parts of the Earth.

15. Limiting our attention to such effects of the external factors as are now before us, we find that life in general is possible only between certain limits of temperature; and life of the higher kinds only within a comparatively narrow range of temperature, maintained artificially if not naturally. Hence social life, pre-supposing as it does not only human life but that life vegetal and animal on which human life depends, is restricted by certain extremes of heat and cold.

16. Passing over such traits of climate as variability and equability, whether diurnal, annual, or irregular, all of which have their effects on human activities, and therefore on social phenomena; the dryness or moisture of the air appears to be an important factor. While either extreme brings indirect impediments to civilization, it is the direct effects—the effects on the vital processes—which are most noteworthy. Needful as are cutaneous and pulmonary evaporation for maintaining the movement of fluids through the tissues and thus furthering molecular changes, we cannot but infer, as the evidence shows, that, other things being equal, there is more bodily activity in the people of hot and dry localities than in those of hot and humid.

17. On passing from climate to surface, the effects of its configuration, as favouring or hindering social integration, have to be noted. The inhabitants of deserts, as well as those of mountain tracts, are difficult to consolidate: facility of escape, joined with ability to live in sterile regions, greatly hinder social subordination. Conversely, social integration is easy within a territory which, while able to support a large population, affords facilities for coercing the units of that population. Other things being equal, localities that are uniform in structure are unfavourable to social progress. Contrariwise the influences of geological and geographical

heterogeneity in furthering social development, are conspicuous. How soil affects progress is plainly shown by the Nile-Valley, with the exceptionally fertilizing process it is subject to. The most ancient social development known to us, began in this region which, fulfilling other requirements, was also characterized by great natural productiveness. The agricultural arts must be considerably advanced before the less fertile tracts can support populations large enough for civilization. Variety of soil, helping to cause multiplicity of vegetal products, is also a factor of importance.

18. The character of its Flora affects in a variety of ways the fitness of a habitat for supporting a society. Extreme scarcity of useful plants is an insurmountable impediment to social progress. Conversely, the materials furnished by a heterogeneous Flora make possible a multiplication of appliances, a consequent advance of the arts, and an accompanying development of skill and intelligence. Mere luxuriance of vegetation may be, however, a hindrance to progress; as with the Andamanese, who are restricted to the sea-shore by the impenetrable thickets which cover the land.

19. The Fauna affects greatly both the degree and the type of social growth. It is an important factor as containing an abundance or scarcity of creatures useful to man —leading to a hunting or a pastoral mode of life; and also as containing an abundance or scarcity of creatures injurious to man. The presence of the larger carnivores and reptiles may be, as in India, a serious impediment to social life. Swarms of insects may destroy the crops, or, as with the *tsetse* in Africa, negative pastoral occupation.

20. To describe fully these original external factors is out of the question. An approximately complete account of the classes characterized above, would be the work of years; to which there would have to be added many environing conditions not yet indicated.

21. It remains to add that the earlier stages of social evolution are far more dependent on local conditions than the later stages. They are more at the mercy of their surroundings.

IV. ORIGINAL INTERNAL FACTORS.

22. As with the original external factors, so with the original internal factors—an adequate account of them supposes a far greater knowledge of the past than is obtainable. The fragmentary evidence there is does not warrant definite conclusions respecting the ways and degrees in which men of the remote past differed from men now existing.

23. The conception of primitive man and his history, must be formed from those existing races of men which, as judged by their visible characters and their implements, approach most nearly to him.

V. PRIMITIVE MAN—PHYSICAL.

24. Since superiority of size is advantageous in conflicts between races, the implication is that the average primitive man was somewhat less than is the average civilized man. Consequently, there must have existed, during early stages when also the groups of men were small and their weapons ineffective, far greater difficulties than afterwards in dealing with the larger animals, both enemies and prey.

25. Inferiority of the lower limbs, alike in size and structure, also made primitive men less able to cope with powerful and swift creatures; whether they had to be escaped from or mastered.

26. His larger alimentary system, adapted to an irregular supply of food, mostly inferior in quality, dirty, and uncooked, besides entailing mechanical loss, gave to the primitive man only an irregular supply of nervous power, smaller in average amount than that which follows good feeding.

27. Apart from stature and muscular development, the uncivilized man is less powerful than the civilized man. He is unable to expend suddenly as great an amount of force,

and he is unable to continue the expenditure of force for so long a time.

28. Among the physiological traits which distinguish man in his primitive state from man in his advanced state, is his relative hardiness.

29. Along with this greater ability to bear injurious actions, there is a comparative indifference to the disagreeable or painful sensations which injurious actions cause; or rather, the sensations they cause are not so acute. The feelings which prompt efforts and cause improvements are therefore weak.

30. Finally, there is the earlier maturity of the primitive man. The growth and structure being completed in a shorter period, implies less plasticity of nature: the rigidity of adult life sooner makes modification difficult. It also increases the obstacles to progress.

VI. PRIMITIVE MAN—EMOTIONAL.

31. That primitive man is deficient in those complex emotions which respond to multitudinous and remote probabilities and contingencies, follows from what has been previously said. (*Psychology*, §§ 139-176, 253, 479-483). His consciousness differs from that of the civilized man by consisting more of sensations, and the simple representative feelings directly associated with them, and less of the involved representative feelings.

32. To conceive the primitive man as he existed when social aggregation commenced, we must generalize as well as we can from the entangled and partially conflicting evidence.

33. First to be noted is the impulsiveness which, pervading the conduct of primitive men, so greatly impedes co-operation. That "wavering and inconstant disposition," which commonly makes it "impossible to put any dependence on their promises," negatives that mutual trust required for social progress. Governed as he is by despotic

emotions that successively depose one another, instead of by a council of the emotions shared in by all, the primitive man has an explosive, chaotic, incalculable behaviour, which makes combined action very difficult.

34. This relative impulsiveness, this smaller departure from primitive reflex action, this lack of the re-representative emotions which hold the simpler ones in check, is accompanied by improvidence. Immediate desire, be it for personal gratification or for the applause which generosity brings, excludes fear of future evils; while pains and pleasures to come, not being vividly conceived, give no adequate spur to exertion: leaving a light-hearted, careless absorption in the present.

35. Along with a tendency to disruption produced by the ill-controlled passions of the individuals, there goes comparatively little of the sentiment causing cohesion. So that, among men carried from one extreme to another by gusts of feeling, among men often made very irritable by hunger, there exists at once a smaller tendency to cohere from mutual liking, and a greater tendency to resist an authority otherwise causing cohesion.

36. The great and immediate benefits brought by the approval of fellow-savages, and the serious evils following their anger and contempt, are experiences which foster into predominance that simplest of the higher sentiments, the love of approbation. From this arises subordination to tribal opinion, and some consequent regulation of conduct.

37. The traits due to presence or absence of the altruistic sentiments, remain to be glanced at. In social groups once permanently formed, the bond of union—here love of society, there obedience caused by awe of power, elsewhere a dread of penalties, and in most places a combination of these—may go along with a very variable amount of altruistic feeling. Though sociality fosters sympathy, yet the daily doings of the primitive man repress sympathy. Active fellow-feeling, ever awake and ever holding egoism in check, does not characterize him; as is conclusively shown

by the treatment women receive. The habitual behaviour to women among any people, indicates with approximate truth, the *average* power of the altruistic sentiments; and the indication thus yielded tells against the character of the primitive man. That highest form of altruistic sentiment distinguished by us as a sense of justice, is very little developed.

38. To these traits must be added one, connected with that of early maturity, which affects them all. It is fixity of habit. The primitive man is conservative in an extreme degree. The foregoing emotional traits harmonize with those which were to be anticipated: a less extended and less varied correspondence with the environment, less representativeness, and less remoteness from reflex action. The primitive man also lacks the benevolence which adjusts conduct for the benefit of others distant in space and time, the equity which implies representation of highly complex and abstract relations among human actions, and the sense of duty which curbs selfishness when there are none present to applaud.

VII. THE PRIMITIVE MAN—INTELLECTUAL.

39. Let us recall those traits of thought which were shown to characterize a lower Evolution as compared with a higher (*Psychology*, §§ 484-93). Conceptions of general facts are deficient in primitive man; prevision of distant results is impossible to him; his belief is relatively rigid; he lacks abstract ideas; and is without notions of definiteness and of truth; and, consequently, of scepticism and criticism; lastly, such imagination as he has, is reminiscent only, not constructive. Bearing these in mind, we shall now be prepared to observe the significance of the facts described by travellers.

40. There are many testimonies to the acute senses, and quick perceptions of the uncivilized, and also to their acute and minute observation. Along with which there

naturally goes great skill in those actions depending on the immediate guidance of perception. In virtue of a general antagonism between the activities of simple faculties and the activities of complex faculties, this dominance of the lower intellectual life hinders the higher intellectual life.

41. The savage is characterized by giving attention to meaningless details, and by a small ability to select facts from which conclusions can be drawn: as in the lower intellects among ourselves, but to a still greater degree. Multitudes of simple observations are incessantly made by him; but such few as have significance, lost in the mass of insignificant ones, pass through his mind without leaving behind any data for thoughts, worthy to be so called. This trait of unreflectiveness is general among inferior races.

42. In the trait of imitativeness, shown least by the highest members of civilized races and most by the lowest savages, the antagonism between perceptive activity and reflective activity is again seen. It shows us a mental action which is, from moment to moment, chiefly determined by outer incidents; and is therefore but little determined by causes involving excursiveness of thought, imagination, and original idea.

43. On perceiving that, to rise from the consciousness of individual objects to the consciousness of species, and again to the consciousness of genera, orders, and classes, each further step implies more power of mentally grouping numerous things with approximate simultaneity; we may understand why, lacking the needful representativeness, the mind of the savage is soon exhausted with any thought above the simplest. His grasp of thought is feeble.

44. The savage, without classified and systematized knowledge, feels no incongruity between any absurd falsehood propounded to him and some general truth which we class as established: there being, for him, no such established general truth. Hence his credulity.

45. This absence of the idea of natural causation, implies

absence of rational surprise. Disregard of novelties is almost uniformly alleged of all the lowest races.

46. Along with this absence of surprise there goes absence of curiosity. He is commonly pictured as theorizing about surrounding appearances; whereas, in fact, the need for explanations of them does not occur to him.

47. One more general trait must be named. It is the lack of constructive imagination. Ingenuity is ascribed only to races that evince higher intellectual development.

48. Here we come to the general truth that the primitive intellect develops rapidly, and early reaches its limit. A fact which implies both low intellectual nature and a great impediment to intellectual advance; since it makes the larger part of life unmodifiable by further experiences. The reader will have seen that these intellectual traits of the uncivilized, recur in the children of the civilized. In final elucidation, let it be pointed out that the development of the higher intellectual faculties has gone on *pari passu* with social advance, alike as cause and consequence. The progress of primitive man is retarded by the absence of capacities which only progress can bring.

VIII. PRIMITIVE IDEAS.

49. A complete account of the original social unit must include the ideas primitive man forms of himself, of other beings, and of the surrounding world. For, manifestly, these greatly affect his conduct.

50. To determine what conceptions are truly primitive would be easy if there were accounts of truly primitive men. For it may be suspected that men of the lowest types now known do not exemplify men as they originally were. Probably most of them had ancestors in higher states; and among their beliefs remain some which were evolved during those higher states. Direct evidence forcibly shows that it is with super-organic aggregates, as with organic aggregates—progression in some causes retrogression in others.

Evolution does not imply, as commonly conceived, an *intrinsic* tendency in everything to become something higher. Hence, simple induction does not here suffice; for the ideas descended by tradition from higher states have to be discriminated from the truly primitive ideas.

51. Deductive interpretation is equally difficult; for comprehension of the thoughts generated in the primitive man by converse with the surrounding world, can be had only by looking at the surrounding world from his stand-point. That is, by suppressing entirely the effects of inheritance and education in its widest sense.

52. Our postulate must be that primitive ideas are natural, and, under the conditions in which they occur, rational. Led in early life to contemplate the beliefs of savages as beliefs entertained by minds like our own, we marvel at their strangeness, and ascribe perversity to those who hold them. This error must be replaced by the truth that the laws of thought are everywhere the same; and that, given the data as known to him, the primitive man's inference is the reasonable inference. The mind of the savage, like the mind of the civilized, proceeds by classing objects and relations with their likes in past experience. (*Psychology*, §§ 309-16, 381.) In the absence of adequate mental power, there result simple and vague classings of objects by conspicuous likenesses, and of actions by conspicuous likenesses; and hence come crude notions, too simple, and too few in their kinds, to represent the facts. That the power of any agent to produce its peculiar effect, may depend on some one property to the exclusion of the rest, or on some one part to the exclusion of the rest, or not on one or more of the properties or parts, but on the arrangement of them, does not occur to the savage. Only after the power of analysis has made some advance does this become possible. Indeed, while physical conceptions are few and vague, any antecedent is thought to serve for any consequent. It is needless to add that these crude notions are inevitably inconsistent to an extreme degree. The sets of ideas

thus formed, and thus characterized may now be glanced at.

53. Not the sky only, with its varying clouds, Sun, Moon, stars, comets, auroras, lightnings, rainbows, and halos; but also the Earth's surface, with its disappearing rain-filled pools of water, its fogs, mirages, sand-whirlwinds, and water-spouts, supply various instances of the disappearance of things which have unaccountably appeared. The primitive idea, hence arising, is that these various entities now manifest themselves and now conceal themselves. The actions of wind prove that there is an invisible form of existence which possesses power, and shows this belief to be plausible. Along with this conception of a visible condition and an invisible condition, which each of these many things has, there comes the conception of duality. Each of them is in a sense double; since it has these two complementary modes of being.

54. Significant facts of another order may next be noted —facts impressing the primitive man with the belief that things are transmutable from one kind of substance into another. Such facts are forced on his attention by imbedded remains of animals and plants. These things have obviously two states of existence, and again involve the notion of duality.

55. Once established, the belief in transformation easily extends to other classes of things. Between an egg and a young bird, there is a far greater contrast in appearance and structure than between one mammal and another. The tadpole, with a tail and no limbs, differs from the young frog with four limbs and no tail, more than a man differs from a hyæna; for both have four limbs, and both laugh. Hence, there seems ample justification for the belief that any kind of creature may be transformed into any other. A belief strongly impressed by insect mimicry. And so there results the theory of metamorphosis in general, which rises into an explanation everywhere employed without check. These experiences of transformations confirm the notion that each

object is not only what it seems, but is potentially something else.

56. The primitive man, left to himself, necessarily concludes a shadow to be an actual existence, which belongs to the person casting it: an attendant that merely comes out on bright days and nights. The greater or less separateness of his own shadow, reminds him of cases where a shadow is quite separate; as in those of the clouds moving along the mountain sides. Shadows, then, furnish further materials for developing both the notion of apparent and unapparent states of being, and the notion of a duality in things.

57. That reflections generate a belief that each person has a duplicate, usually unseen, but which may be seen on going to the waterside and looking in, is not an *a priori* inference only: there are facts verifying it. Reflections confirm the notion that existences have their visible and invisible states, and strengthen the implication of a duality in each existence.

58. No physical explanation of an echo can be framed by the uncivilized man. For what can he know about the reflection of sound-waves? Facts show that to the primitive mind an echo is conceived as the voice of some one who avoids being seen. Once more duality is implied: there is an invisible state as well as a visible state.

59. What happens in the primitive mind when there has been accumulated this chaotic assemblage of crude ideas, having, amid their differences, certain resemblances? What particular example of the prevalent duality, plays the part of an organizing principle to the aggregate of primitive ideas? We must look for some experience in which this duality is forcibly thrust on the attention. First identifying this typical notion, we must afterwards enter on a survey of the conceptions which result.

IX. THE IDEAS OF THE ANIMATE AND THE INANIMATE.

60. To understand the nature of the conceived distinction between the living and the not-living in the mind of primitive man, its development through the lower forms of consciousness must be glanced at.

61. Among the inferior types of animals, the original consciousness of an animate object is associated with motion. Among the lowest creatures *motion* implies life.

62. Where intelligence rises beyond the merely automatic, the motion implying life begins to be distinguished from other motion by its *spontaneity*. Without being struck or pushed by anything external, bodies which are alive suddenly change from rest to movement, or from movement to rest.

63. A further test used by intelligent animals to discriminate the living from the not-living, is the *adaptation* of motion to ends.

64. This ability to class apart the animate and inanimate, is inevitably developed in the course of evolution. Under penalties of death by starvation or destruction, there has been a constant cultivation, and consequent increase, of the faculty.

65. Consciousness of the difference between the animate and inanimate, growing ever more definite as intelligence evolves, must be in primitive man more definite than in all lower creatures. To suppose that without cause he begins to confound them, is to suppose the process of evolution is inverted.

66. Certain facts are named as implying that children fail in this discrimination. Should it be said that a child, endowing its playthings with personalities, speaks of them and fondles them as though they were living; the reply is that this shows not belief but deliberate fiction. Though pretending that the things are alive, the child does not really think them so. Were its doll to bite, it would be no less astounded than an adult would be.

67. How is it possible, then, to explain the extreme prevalence of beliefs which give personalities to inanimate things? We shall find the explanation in certain attendant phenomena on the continually-recurring states in which living things simulate things not alive.

X. THE IDEAS OF SLEEP AND DREAMS.

68. The primitive man knows nothing of sensations and ideas—has no words for them, and can form no conception of mind as an internal existence distinct from body. What explanation therefore can he give of dreams?

69. A sleeper, after one of those very vivid dreams, caused by preceding hunger or repletion, thinks he has been elsewhere; witnesses say he has not; and their testimony is verified by finding himself where he was when he went to sleep. What then is the resulting notion? The simple course is to believe both that he has remained and that he has been away—that he has two individualities, one of which leaves the other and presently comes back. He, too, has a double existence, like many other things.

70. From all quarters come proofs that this is the conception actually formed of dreams by savages, and which survives after considerable advances in civilization have been made. Somnambulism serves to confirm this interpretation. For to the uncritical, a sleep-walker seems to be exemplifying that activity during sleep, which the primitive conception of dreams implies.

71. Along with this belief there of course goes the belief that persons dreamt of were really met. If the dreamer thinks his own actions real, he ascribes reality to whatever he saw, whether it be place, thing, or living being. It is only needful to imagine ourselves de-civilized, with faculty decreased, knowledge lost, language vague, and scepticism absent, to understand how inevitably the primitive man conceives as real, the dream-personages we know to be ideal.

72. These beliefs concerning dreams, exercise a reflex action on other beliefs. Besides fostering a system of erroneous ideas, they discredit the true ideas which accumulated experiences of things are ever tending to establish.

73. That the primitive man's conception of dreaming is natural, is obvious. His notions seem strange because, in thinking about them, we carry with us the theory of Mind which civilization has slowly established. Let it be borne in mind that these dream experiences necessarily precede the conception of a mental self; *and are the experiences out of which the conception of a mental self eventually grows.*

XI. THE IDEAS OF SWOON, APOPLEXY, CATALEPSY, ECSTASY, AND OTHER FORMS OF INSENSIBILITY.

74. A swoon, lasting for minutes or for hours, confirms the belief in a duplicate that wanders away from the body and returns to it. The desertion of the body being more determined than in sleep, and being followed by silence as to what has been done or seen in the interval.

75. How again can the savage discriminate apoplexy, when the instructed medical man says it "is liable to be confounded with syncope, or fainting, and with natural sleep."? (Forbes, Tweedie and Conolly, *Cyclopædia of Practical Medicine*, I, 120.)

76. In catalepsy resumption of the ordinary state is as sudden as was cessation of it. And, as with apoplexy, "there is no recollection of anything which occurred during the fit." (*Ib.* I, 359.)

77. Ecstasy is similarly interpretable. While, by making no responses to ordinary stimuli, the ecstatic subject shows that he is "not himself," he seems to have vivid perceptions of things elsewhere.

78. Most significant of all, however, are the insensibilities which have obvious antecedents: those which follow wounds and blows. The injured man may shortly "return to

himself," and not go away again; or, returning to himself only after a long absence presently desert his body for an indefinite time; or, lastly, a violent blow may cause continuous absence from the first.

79. These evidences originate a further group of notions concerning temporary absences of the other-self. From swoon, apoplexy, trance, and ecstasy, being not unfrequently preceded by feelings of weakness and ill-health in the patient, and signs of it to the spectators, there is roused in both a suspicion that the other-self is about to desert. Consequently these prolonged absences of the other-self become mentally associated with its impending absences at other times. Hence an interpretation of ill-health or sickness.

80. Ignoring the specialities of these interpretations, and recognizing only the trait common to them; the fact to be observed is, that these abnormal insensibilities are inevitably interpreted in the same general way as the normal insensibility daily witnessed: the two interpretations supporting one another.

XII. THE IDEAS OF DEATH AND RESURRECTION.

81. If, with the experiences of civilization, we are unable correctly to diagnose death—to be sure whether revival will, or will not, take place; how can the primitive man be sure? What ideas does he form of death?

82. Abundant proofs are furnished by the behaviour of the savage, that the insensibility of death is thought of by him as similar to all the other insensibilities: it is only temporary. Various acts are prompted by this belief.

83. First come attempts to revive the corpse—to bring back the other-self. Beginning with the call, which wakes the sleeper and sometimes seems effectual in reviving one who has swooned, this speaking to the dead develops in various directions, until the attempts at resuscitation become very strenuous and very horrible; as with the Hottentots who even reproach and ill-use the dying, and those just

dead, for going away. The custom continues even where immediate reanimation is not looked for.

84. The belief that death is a long-suspended animation is again enforced by the custom of giving the corpse food; in some cases of actually feeding it; and in most cases of leaving things to eat and drink upon the grave for its use. Provisions are supplied even after cremation. The origin of this custom may possibly have been from seeing, as is occasionally the case, some patient in a trance swallow morsels put into his mouth.

85. What is the limit to the time for the return of the other-self? The primitive man cannot say. The answer is at least doubtful, and he takes the safe course: he repeats the supplies of food.

86. Other sequences, equally remarkable, may next be named. The corpse must not suffer discomfort from pressure, or impediments to breathing; while fire to give warmth, or to cook by, is even in some cases provided.

87. Resuscitation as originally conceived, cannot take place unless there remains a body to be resuscitated. Expectation of a revival is therefore often accompanied by recognition of the need for preserving the corpse from injury. While in some cases the desire to hide the corpse and its belongings from enemies, brute and human, predominates; in other cases it is the desire to protect the corpse against imagined discomfort, leading to the practice of raising the corpse to a height above the ground, as on scaffolds. In other cases, again, the wish is to preserve the body from injuries by covering it over; from this arise such structures as the Egyptian pyramids, an evident development of the small mound necessarily resulting from the displacement of earth by the buried body.

88. With the belief that re-animation will be prevented if the returning other-self finds a mutilated corpse, or none at all; there goes the belief that putrefaction must be stopped. Hence the practice of embalming.

89. Some further funeral rites, indirectly implying the

belief in resurrection, must be added. They are those bodily mutilations which, in so many cases, are marks of mourning. The cutting off of the hair in grief is made to propitiate the presently reviving dead—the hair is given as a pledge; and that the accompanying self-bleedings, gashings, and amputations, have the like meaning may be gathered from Samoa, where self-bleeding is called "'an offering of blood' for the dead." (Rev. G. Turner, *Nineteen Years in Samoa.* 1860. 227.)

90. And now observe, finally, the modification by which the civilized belief in resurrection is made partially unlike the savage belief. There is no abandonment of it: the anticipated event is simply postponed. At first revival is looked for in a few hours, days, or years; but gradually, as death becomes more definitely conceived, revival is not looked for till the end of all things.

XIII. THE IDEAS OF SOULS, GHOSTS, SPIRITS, DEMONS, ETC.

91. The credulity and illogicality of the educated men of our own time, render the inference easy that the primitive man's ideas of the other-self, impossible though they look to us, may nevertheless be entertained.

92. The often-cited notion of the Australians, so definitely expressed by the condemned criminal who said that after his execution he should jump up a white-fellow and have plenty of sixpences, is borne out by many other cases, and puts beyond doubt the belief that the other-self is at first conceived as no less material than its original. A belief implied by such acts as spreading flour about to see "by the footsteps whether the deceased has been moving about," (P. J. de Arriaga, *Extirpacion de la idolatria del Piru.* Lima. 1621. 34.)

93. The transition from this original conception, to the less crude conceptions which come later, can be seen from the conceptions which prevailed among the Hebrews. Here angels dining with Abraham, or putting Lot into the house,

apparently possess complete corporeity; there both angels and demons are spoken of as swarming invisibly in the surrounding air, thus being incorporeal. The still extant belief in the torture of souls by fire similarly pre-supposes some kind of materiality.

94. Mingled with these ideas of semi-substantial duplicates, and inconsistently held along with them, are the ideas of aeriform and shadowy duplicates. The contrast between the dying man and the man just dead, has naturally led to a conception of the departed in terms of the difference. The heart ceasing to beat, leads some races to think that it is the other-self; while others identify the departed other-self with the departed breath.

95. Language, from all parts of the world, and from peoples in all stages, furnishes indirect evidence that the conceptions of the other-self are thus derived.

96. Certain derivative conceptions of great significance follow. Quadrupeds and birds breathe, hence they must have other-selves—have ghosts. And similarly where there exists the belief that men's shadows are their souls, it is inferred that the shadows of animals and plants, which follow and mimic them in like ways, must be the souls of the animals and plants. But this is not all. If shadows are souls, other things must have souls, a belief that arises in the more intelligent races, and develops.

97. There are thus various classes of souls:—Those of deceased parents and relatives; those more vague ones of ancestors; those wandering doubles of persons who are asleep, or more profoundly insensible; those of friends and enemies; and lastly, those of beasts, plants, and inert objects.

98. It remains only to note the progressive differentiation of the conceptions of body and soul. The second self grows step by step less substantial: now it is semi-solid, now it is aeriform, now it is etherial. Finally there remains only the assertion of an existence that is wholly undefined.

XIV. THE IDEAS OF ANOTHER LIFE.

99. Belief in re-animation implies belief in a subsequent life. The primitive man, incapable of deliberate thought, and without language fit for deliberate thinking, has to conceive this as best he may. Hence there results a chaos of ideas concerning the after state of the dead.

100. One of the experiences suggesting another life, also suggests a limit to it; namely, the appearance of the dead in dreams. Manifestly the dead recognized in dreams, must be persons who were known to the dreamers; and consequently, those who have been dead a long time, ceasing to be dreamt of, cease to be thought of as still existing.

101. What is the character of this after-life? From the fact that the other-self is at first believed to be quite substantial; it follows that it is originally thought to differ in nothing from this life.

102. The deceased, somehow keeping himself out of sight, eats, drinks, hunts, and fights as before; with this difference only, that the gratifications and activities are more abundant and more successful.

103. Carrying out consistently this conception of the second life, uncivilized peoples infer that, not only the inanimate possessions of the deceased, but also his animate possessions, will be needed. Consequently, his weapons and implements, his clothing, ornaments, and other movables, together with his slaughtered domestic animals, are deposited near him so that he may not miss them.

104. Logically developed, the primitive belief implies something more; the deceased will want human companionship and services. Hence the immolations which have prevailed, and still prevail, so widely. The custom of sacrificing wives, and slaves, and friends, develops as society advances through its earlier stages, and the theory of another life becomes more definite. In considerably advanced societies slaves are even killed previous to the decease, in order that they may "prepare the house for their master." (F.

Ximenes, *Las historias del origen de los Indios de Guatamala.* 1857. 212.) The intensity of the faith prompting these customs, we shall the better conceive on learning that the victims are often willing, and occasionally anxious, to die. As with the Chibchas, who "interred the wives and slaves who most wished it."—(P. Simon, *Noticias historiales.* In Kingsborough's *Antiquities of Mexico.* 1830. VIII. 258.)

105. The second life is also conceived as like the first in its social arrangements. Subordination, both domestic and public, is expected to be the same hereafter as here. As an illustration of this, among the lower races, we may mention that the heaven of the Karens "has its rulers and its subjects." (Asiatic Society of Bengal, *Journal,* XXXIV, Part II. 205.) That this analogy persists in the conceptions of higher races, is shown in the heaven of the Hebrews having archangels set over different elements and over different peoples.

106. Along with this parallelism between the social systems of the two lives, may fitly be named the closeness of communion between them. The creed of Christendom, under its predominant form, implies this. The living pray for the dead; and the canonized dead are asked to intercede on behalf of the living.

107. The second life is originally conceived also as repeating the first in conduct, sentiments, and ethical code. The Fijian gods "are proud and revengeful, and make war, and kill and eat each other, and are, in fact, savages like themselves." (Capt. J. E. Erskine, *Cruise among the Islands of the Western Pacific.* 1853. 247.)

108. Here we are introduced to the divergence of the civilized idea from the savage idea. As the idea of death gets gradually marked off from the idea of suspended animation; and as the anticipated resurrection comes to be thought of as more and more remote; so the distinction between the second life and the first life, grows, little by little, decided. The second life diverges by becoming less

material; by becoming more unlike in its occupations; by having another kind of social order; by presenting gratifications more remote from those of the senses; and by the higher standard of conduct it assumes. And while thus differentiating in nature, the second life separates more widely from the first. Communion decreases; and there is an increasing interval between the ending of the one and the beginning of the other.

XV. THE IDEAS OF ANOTHER WORLD.

109. By a process akin to the processes lately contemplated, the place of residence for the dead diverges slowly from that for the living.

110. Originally the two coincide. If the savage renews the supplies of food at the graves of his dead relatives, and otherwise propitiates them, the implication is that they are not far away, or that they will soon be back.

111. The region said to be haunted by the souls of the dead gradually becomes wider. Though they revisit their old homes, yet they commonly keep at some distance. An idea generated by the burial of the dead in adjacent mountains. Where caves are used for interments, they become the supposed places of abode for the dead; and hence develops the notion of a subterranean other-world.

112. What changes the idea of another world close at hand, to the idea of another world comparatively remote? The answer is simple—migration. The dreams of those who have lately migrated, initiate beliefs in future abodes which the dead reach by long journeys; they often dream of the places and persons left behind; and thus render familiar the notion of revisiting them during sleep. Obviously at death, interpreted as it is by the primitive man, the other-self is thought to have gone to the place which he often went to, and from which at other times he returned. He longed to go back, and frequently said he would go back. Now he has kept his word. This interpretation is met with

everywhere. Migrations having been made in all directions, there must, on this hypothesis, have arisen many different beliefs respecting the direction of the other world. These we find. There is the journey to an under-world. The belief in the indefinite extension of which is easily seen to arise, on remembering the long ramifying passages formed by water in limestone formations all over the globe, ending here in some impassable chasm, or there in some underground river. There is also the journey over land, or, where the migrating tribe has reached its new habitat by ascending a river, the journey down the river; which latter brings us with scarcely a break to the remaining kind of journey—that over the sea. These varied journeys entail varied preparations for them, as for example, the body being placed in a canoe for the journey down the river.

113. There arise beliefs in two or more other-worlds, when migration is joined with conquest. On remembering that victors become the military class, while the vanquished become slaves who do not fight, and that in societies so constituted, worth is measured by bravery, it becomes evident why the other-worlds of upper and lower classes come to be regarded as places for worthy and unworthy: as places for good and bad.

114. The remaining conception of another world, above or outside of this world, is interpretable after the same general manner. Burial on hills is practised by many peoples; and there are places, as Borneo, where, along with the custom of depositing a chief's remains on some peak difficult of access, there goes the belief that the spirits of the departed inhabit the mountain-tops. That the custom causes the belief is probable. Here, however, it is only necessary to observe that the highest mountain in sight is regarded as a world peopled by the departed; and that in the undeveloped speech of savages, living on a peak up in the heavens is readily confounded with living in the heavens. From the fact that, originally, the firmament is considered as a dome supported by these loftiest peaks, the conclusion

is inevitable that those who live on them will have access to it.

115. Thus, the locality of the other life, passes from a completely-known adjacent spot, to a somewhere unknown and unimagined.

XVI. THE IDEAS OF SUPERNATURAL AGENTS.

116. In using the word supernatural, the reader must be cautioned against ascribing to the primitive man a conception like that which the word gives to us. Until there has been reached that idea of orderly causation which we call natural, there can exist no such idea as is now implied by the word supernatural.

117. It has been shown that, originally, the ghosts of the departed are thought of as close at hand—haunting the old home, lingering near the place of burial, and wandering about in the adjacent bush. Continually accumulating by deaths, they form a surrounding population; usually invisible, but some of them occasionally seen. From this population, ever present, arises the potentiality of countless supernatural agencies capable of indefinite variation.

118. Hence the naturalness, and, indeed, the inevitableness, of the primitive interpretations of surrounding phenomena. Clouds, shooting stars, animal metamorphoses, storms, earthquakes, eruptions—all of them are now understood. These souls of the dead, to whose powers no limits are known, are omnipresent. Explaining, as their agency seems to do, all unexpected changes, their own existence becomes further verified. To the primitive man no other causes for such changes are known, or can be conceived; therefore these souls of the dead must be the causes; therefore the survival of souls is manifest: a circular reasoning which suffices many besides savages.

119. Of course the ghosts of the dead, ever at hand, must also interfere with human actions. The soul of a dead foe is on the watch to cause an accident; the soul of a late

relative is ready to help and to guard if in good humour, or, if offended, to make something go wrong.

120. Lastly, and chiefly, this machinery of causation which the primitive man is inevitably led to frame for himself, fills his mind to the exclusion of any other machinery. This hypothesis of ghost-agency has sole possession of the field.

XVII. SUPERNATURAL AGENTS AS CAUSING EPILEPSY AND CONVULSIVE ACTIONS, DELIRIUM AND INSANITY, DISEASE AND DEATH.

121. Setting out afresh from the insensible body as the starting point, a further class of ideas has now to be observed, which has been simultaneously developing by the aid of the ideas just considered.

122. If souls can leave bodies and re-enter them, why should not bodies be entered by strange souls, while their own souls are absent? If, as in epilepsy, the body performs acts which the owner denies having performed, there is no choice but to assume such an agency.

123. Similarly, if certain uncontrollable movements, as those of hysteria, as well as the familiar ones of sneezing, yawning, and hiccough, take place involuntarily, the conclusion must be that some usurping spirit has entered into the subject's body and directs his actions in spite of him.

124. This hypothesis explains, too, the strange behaviour of the delirious and the insane. That a maniac's body has been taken possession of by an enemy, is proved by the fact that it is impelled to self-injury. Its right owner would not make the body bite and tear itself. Further, the possessing demon is heard to hold converse with other demons, which are visible to him, but which bystanders do not see.

125. And if these remarkable derangements of body and mind are thus effected, the manifest inference is that diseases and disorders of less remarkable kinds, as sickness, fever, and small-pox, are effected in the same way. Should

there not be a demon within the body, there must be, at any rate, some invisible enemy at hand, who is working these strange perturbations in it.

126. Death, often occurring after long-continued disease, must be caused by that which caused the disease. Whenever the death has no visible antecedent, this is the only possible supposition; and even where there is a visible antecedent, it is still probable that there was some demoniacal interference. The giving way of a companion's foothold and his consequent fatal fall down a precipice, or the particular motion which carried a spear into his heart, was very likely determined by the malicious spirit of a foe.

127. Considered thus as following from the primitive interpretation of dreams, and the consequent theory of ghosts, souls, or spirits, these conclusions are quite consistent.

XVIII. INSPIRATION, DIVINATION, EXORCISM, AND SORCERY.

128. The savage thinks that if a man's body may be entered by a demon, it may also be entered by a friendly soul.

129. Hence any display of bodily energy exceeding that which is ordinary, is attributed to the fact either that there is possession by a supernatural being, or that a supernatural being in disguise is present.

130. Similarly with extraordinary mental power. If an incarnate spirit, having either the primitive character of an ancestral ghost or some modified and developed character, can give superhuman strength of body, then it can give, too, superhuman intelligence and superhuman passion. A theory still living in both sacred and secular thought.

131. The diviner is simply the inspired man using his supernatural power for particular ends. Fasting, or some mode of living to produce abnormal excitement, is everywhere a preparation for the diviner's office. Everywhere, too,

this excitement is ascribed to the possessing ghost, demon, or divinity; and the words uttered are regarded as his.

132. Inevitably there is a further development of these ideas. If some men are possessed to their hurt by spirits of evil, while others are possessed to their benefit by friendly spirits, as powerful or more powerful, is it not possible, by the help of the good spirits, to undo the mischief done by the bad ones—perhaps to conquer and expel them? Exorcism arises from the belief that it is. Since the meanings of ghost, spirit, demon, devil, angel, were at first the same, we may infer that what eventually became the casting out of a devil, was originally an expulsion of the malicious double of a dead man.

133. A medicine-man who, helped by friendly ghosts, expels malicious ghosts, naturally asks himself whether he may not by such aid revenge himself on enemies, or achieve ends not else possible. The belief that he can initiates sorcery. The operations of the sorcerer are guided by the notion—referred to in *Sociology*, § 52—that the special power or property of an object is supposed to be present in all its parts; it even extends to whatever is associated with it. Consequently the sorcerer begins by obtaining a part of, or something closely associated with, his victim's body, or else by making a representation of him; and then he does to this part, or representation, something which he thinks is thereby done to his victim. Turning from this simpler form of magic to the form in which supernatural agents are employed, we find that the primitive ghost theory, implying but little difference between dead and living, fosters the notion that the dead can be acted on by arts like those which act on the living; and hence results that species of magic which, in its earlier form, is a summoning of the dead to get information from them; as the witch of Endor summons the Spirit of Samuel, and in its later form is a raising of demons to help in mischief.

134. Exorcism and sorcery passes insensibly into miracle. If the marvellous results are ascribed to a supernatural being

at enmity with the observers, the art is sorcery; but if ascribed to a friendly being, they are classed as miracles.

135. To gain the good-will of these souls or spirits, originally thought to be like living men in their perceptions and intelligence, the practice of pacifying them if angry, and pleasing them if friendly, begins. From this policy all religious observances take their rise.

XIX. SACRED PLACES, TEMPLES, AND ALTARS; SACRIFICE, FASTING, AND PROPITIATION; PRAISE, PRAYER, ETC.

136. There is abundant proof that the place where the dead are, awakens in savages an emotion of fear; is approached with hesitating steps; and acquires the character of sanctity. This awe excited by the dead grows into a sentiment like that excited by the places and things used for religious purposes.

137. On being reminded that when primitive men ceased to dwell in caves, they continued to use them as cemeteries; and on remembering, further, the general custom of carrying offerings to these places of the departed; we see how there arises the sacred cave or cave-temple. Similarly with house-burial. Where the abandoned house is left to the ghost of the deceased, it becomes a place regarded with awe. And moreover, as repeated supplies of food are taken to it; and other propitiatory acts are performed; the deserted dwelling-house, turned into a mortuary-house, acquires the attributes of a temple. Where house-burial is not practised, the sheltering structure raised above the grave, or above the stage bearing the corpse, becomes the germ of the sacred building. In later times, every detached mausoleum containing the bones of a distinguished man, is visited with feelings akin to the religious, and is an incipient place of worship.

138. The grave-heap has the same relation to offerings for the dead that an altar has to offerings for a deity. Practices, alike uncivilized and civilized, show the original

altar to be that which supports offerings to the dead; and hence its various forms: a heap of turf, a pile of stones, a raised stage, or with the civilized, a stone coffin.

139. We pass naturally from the genesis of altars, to the genesis of sacrifices. Alike in motive and method, the offering of food and drink to the dead man parallels the offering of food and drink to a deity. Observe the points of community. The giving of portions of meals; the larger oblations on special occasions; and the larger annual oblations. The things offered are the same: in both cases we have oxen, goats, &c.; bread and cakes; local wine, incense, and flowers; and, in short, whatever consumable commodities are most valued, down even to tobacco and snuff. Nor is there any difference in the mode of preparation. Both to spirits and to deities we find uncooked offerings and also burnt offerings. Gods are supposed to profit by the sacrifices as ghosts do, and to be similarly pleased. Lastly, in sundry cases, the sacrifices to ghosts and gods coexist in undistinguishable forms.

140. Little as such an origin would be expected, fasting, as a religious rite, is a sequence of funeral rites. Causing vivid dreams, fasting may be a deliberately adopted method of obtaining interviews with the spirits; or, the fasting may be obligatory—may result from making excessive provision for the dead. By implication this grows into an accepted mark of reverence; and finally becomes a religious act.

141. From this incidental result, introduced parenthetically, let us return to our study of the way in which the offerings at burials (*Sociology*, § 89) develop into religious offerings. Alike in the immolation of human victims, in the offering of blood, in the offering of portions of the body, and even of hair, funeral rites are paralleled by religious rites. Remembering that a man's ghost is supposed to retain the likings of the living man, it follows that among cannibals the offering of human flesh to the dead is inevitable. The Fijians display the entire series of

sequences—cannibalism during life, cannibal ghosts, cannibal deities, and human sacrifices made as religious rites. If blood shed at a funeral was at first meant for the refreshment of the ghost—if when shed on subsequent occasions to get the aid of a dead king's ghost in war, it became a blood offering to a supernatural being for special propitiation; it can scarcely be doubted that the offering of human blood to a deity with a like motive, is but a further development of the practice.

142. When alive the savage's relatives were pleased by applause; and now that, though invisible, they are often within hearing, he thinks praise will still be pleasing to them. Hence, beginning with eulogy of the dead as a funeral rite, passing to praises repeated for a time, then to praises both occasional and periodic that are established, we rise to the characteristics of religious praises. Moreover, the two are alike in the ascribed demand for them by supernatural beings; in the nature of them as narrating great deeds; and in the motive for them as a means of obtaining benefits or avoiding evils.

143. Yet another parallelism. Along with praises of the dead there go prayers to them. Prayers made to the dead for aid, for blessing, for protection, afterwards become prayers made to divinities for like advantages.

144. Ancestral ghosts who are supposed to cause diseases, as gods send pestilences, are similarly propitiated by special sacrifices: the ascribed motives of ghosts and gods being the same in kind, and the modes of appealing to those motives the same. The parallelism runs into various details. There is oversight of conduct by ghosts as there is by deities; there are promises of good behaviour to both; there is penitence before the one as before the other; and there is repetition of injunctions given by the dead, as there is repetition of divine injunctions. There is a maintenance of fires at graves, as there is in temples; and both are used as places of refuge. A distinguished man is invoked to witness an oath, as God is invoked. Secrecy is maintained respect-

ing the name of the dead, as in some cases respecting the name of a god. There are pilgrimages to the graves of relatives and martyrs, as well as to the graves of supposed divine persons. In some cases parts of the dead are swallowed by the living, to inspire themselves with the good qualities of the dead, who are supposed to be thereby honoured.

145. Can so many and such varied similarities have arisen in the absence of genetic relationship? Suppose the two sets of phenomena unconnected—suppose primitive men had, as some think, the consciousness of an Universal Power whence they and all other things proceeded. What probability would there be that to such a Power they would perform an act like that performed to the dead body of a fellow-savage? And if one such community would not be probable, what would be the probability of the score of communities above specified? In the absence of causal relation the chances against such a correspondence would be almost infinity to one.

XX. ANCESTOR-WORSHIP IN GENERAL.

146. Taking the aggregate of human peoples—tribes, societies, nations—there is abundant evidence to show that nearly all of them, if not literally all, have a belief, vague or distinct, in a reviving other-self of the dead man.

147. Within this class of peoples is a class not quite so large, by the members of which the other-self of the dead man is supposed to exist for a time, or always, after death. Nearly as numerous is the class of peoples included in this, who display ghost propitiation at the funeral, and for a subsequent interval. Then comes the narrower class contained in the last—those more advanced peoples who, along with the belief in a ghost which permanently exists, show a persistent ancestor-worship. Again, somewhat further restricted, there is a class of peoples whose worship of distinguished ancestors partially subordinates that of the un-

distinguished. And eventually, the subordination growing more decided, becomes marked where these distinguished ancestors were leaders of conquering races.

148. Contemplating ancestor-worship from the standpoint of those who practise it, what is its least developed form? The Amazulu, whose ideas have been taken down from their own lips, show it to be an unhistoric ancestor-worship. There have arisen no personages dominant enough to retain their distinct individualities through many generations, and to subordinate the minor traditional individualities.

149. Progress is shown by peoples who are more settled and further advanced. Along with worship of recent and local ancestors, there goes worship of ancestors who died at earlier dates, and who, remembered by their power, have acquired in the general mind a supremacy. Pages might be filled by evidence showing that the remotest remembered ancestors have become divinities, remaining human in physical and mental attributes, and differing only in power; that being recognized in tradition as the begetters, or causers, of existing men, they, as the only known causers of anything, come to be regarded as the causers of other things; and that they reside in the region whence the race came, which is the other-world travelled to by the dead. The statements directly imply that transformation of ancestors into deities, which was found to be indirectly implied by the growth of funeral rites into worship of the dead, and eventually into religious worship.

150. It is said, however, that ancestor-worship is peculiar to the inferior races. And it is suggested that the Indo-European or Semitic nations, who in their earliest recorded times had higher forms of worship, were not even in their still earlier times, ancestor-worshippers. These assumptions would be inadmissable, even were there no indications of the original Aryan beliefs; and are still more inadmissible now that it is known what the original Aryan beliefs were. As expressed in their sacred writings, they are essentially the same as those of existing barbarians. Strong evidence

must be assigned before it can be admitted that the Semitic races furnish a solitary example; and no such strong evidence is forthcoming. Contrariwise, what positive facts there are have opposite implications.

151. Mythologists, however, say that these observances have a moral rather than a religious character. Contemplating this proposed distinction under its concrete aspects, would enable us to say at least this, that were he allowed equal license in dealing with facts, the feeblest dialectician might safely undertake to establish any proposition that could be named.

152. That the superior races have passed through this lower cult, will be again seen on remembering that down to the present time, ancestor-worship lingers amongst the most civilized of the superior races. Throughout Europe it still shows itself, here feebly and there with vigour, notwithstanding the repressive influence of Christianity.

153. Induction justifies deduction, and verifies the inference suggested in the last division. As societies advance, and as traditions, local and general, accumulate and complicate, the once-similar human souls, acquiring in the popular mind differences of character and importance, will diverge; until their original community of nature becomes scarcely recognizable. It will be well to contemplate some of their most conspicuous types.

XXI. IDOL-WORSHIP AND FETICH-WORSHIP.

154. Propitiation of the man just dead leads to propitiation of his preserved body, or a preserved part of it. The ghost is supposed to be present in each.

155. The transition from worship of the preserved body, or a preserved part of it, to idol-worship, is seen where the object worshipped is a figure of the deceased, made partly of his remains and partly of other substances.

156. The Mexicans show a still further transition. When men killed in battle were missing, they made figures of them,

and honoured these; and, cremation being practised among them, subsequently burnt them. In Africa kindred observances occur.

157. We have but to recall the horror a child shows on seeing an adult put on an ugly mask, even when the mask has been previously shown it, to conceive the awe which a rude effigy excites in the primitive mind. The sculptured figure of the dead man arouses the thought of the actual dead man, which passes into a conviction that he is present.

158. And why should it not? If the ghost can come back and animate afresh the dead body, why should not a spirit go into an image? A living body differs more from a mummy in texture, than a mummy does from wood. Obviously this was the reasoning of the Egyptians who provided for the *ka*, or *double*, of a dead man, a statue or statues entombed with his dried body, as substitutes for it should it be destroyed. The proofs are many and conclusive that the savage, thinking the effigy of the dead man is inhabited by his ghost, propitiates it accordingly. And as the effigy of the dead man develops into the idol of the god, the sacrifices to it are made under a kindred belief in a spiritual resident.

159. The belief arises that as a dead body, or a mummy, or an effigy, may be entered by a spirit; so, too, may a shapeless stone. Adoration of inanimate objects thus possessed by ghosts, becomes adoration of the indwelling ghosts; and the powers ascribed to them, the powers of such ghosts.

160. Evidences from all sides, converge to the conclusion that the fetich-worship is the worship of a special soul supposed to have taken up its abode in the fetich; which soul, in common with supernatural agents at large, is originally the double of a dead man.

161. Whatever the fetich may be, the resident spirit is nothing but a modification of an ancestral ghost, deviating more or less according to circumstances. The fetich, besides

otherwise corresponding to the ghost, corresponds as being expected to resume, in like manner, the original bodily form.

162. A corollary may now be drawn from this interpretation of fetichism. Evidence has been given that sundry low types of men have either no ideas of revival after death, or vague and wavering ideas: the conception of a ghost is undeveloped. If, as contended above, the worship of the fetich is the worship of an indwelling ghost, or a supernatural being derived from the ghost; it follows that the fetich-theory, being dependent on the ghost-theory, must succeed it in order of time. Proofs are abundant that fetichism will only arise after the ghost-theory has arisen.

163. The idea, that fetichism comes first among superstitions, is not only disproved by induction, but deduction also discredits it. The savage has no words for separate properties, much less a word for property in general; and if he cannot even conceive a property apart from an aggregate displaying it, how can he imagine a second invisible entity as causing the actions of the visible entity? Only as the ghost-theory evolves does this idea arise.

164. Propitiation of the dead, which, originating funeral rites, develops into the observances constituting worship in general, has thus, among its other divergent results, idol-worship and fetich-worship. All stages in the genesis of these are traceable. That idolatry and fetichism are aberrant developments of ancestor-worship, will become clearer still on passing to the kindred group of facts which now follow.

XXII. ANIMAL-WORSHIP.

165. The savage seeing daily such animal metamorphoses as the maggot changing to the fly, and the egg to the bird, yields to any suggestion, however caused, that a creature has assumed a different shape.

166. All races furnish evidence of the belief in the transformations of men into animals, or of animals into men. As, for instance, with the Thlinkeets "the bear is supposed to

be a man that has taken the shape of an animal." (H. H. Bancroft. *The native races of the Pacific States of N. America.* 1875-6. III. 129.) And with the Khonds "Witches have the faculty of transforming themselves into tigers." (Gen. J. Campbell. *The wild tribes of Khondistan.* 1864. 44.) While his experiences prepare the savage for supposing metamorphoses, if circumstances suggest them, it must not be assumed that he supposes them without suggestive circumstances. These circumstances are of three kinds; and lead to three groups of allied, but partially different, beliefs.

167. The other self of the dead relative is supposed to come back occasionally to his old abode: how else is it possible for the survivors, sleeping there, to see him in their dreams? Here are creatures which commonly, unlike wild creatures in general, come into houses—come in, too, secretly in the night. The implication is clear. That snakes, which especially do this, are the returned dead, is inferred by peoples in Africa, Asia, and America: the haunting of houses being the common trait of the kinds of snakes reverenced or worshipped; and also the trait of certain lizards, insects, and birds similarly regarded.

168. By most peoples the ghost is believed now to revisit the old home, and now to be where the body lies. If, then, creatures which frequent houses are supposed to be metamorphosed ancestors, will not creatures habitually found with corpses be also considered as animal forms assumed by the dead? We have proofs that they are, for the creatures found in caves used for burials, come to be taken for the new shapes assumed by departed souls. From bats and owls being conceived as winged spirits, arise the ideas of devils and angels.

169. Before dealing with supposed transformations of a third kind, two explanatory descriptions are needed: one of primitive language, and the other of primitive naming. Having *a posteriori* verifications of the *a priori* inference, that early speech is meagre, incoherent, and indefinite, we

must anticipate countless erroneous beliefs caused by misapprehensions; and extreme and multitudinous distortions of traditions.

170. Proper names were not always possessed by men. An individual was at first signified by something connected with him, which, when mentioned, called him to mind. Remembering that this habit survives among ourselves, so that the cunning person is called a fox, the rude a bear, the keen a hawk, and so on—observing that in those ancient races who had proper names of a developed kind, animal-nicknaming still prevailed; let us ask what resulted from it in the earliest stages.

171. If the higher races confound the metaphorical with the literal—if from accounts of tribes without governors, described as without heads, there has arisen among civilized people the belief that there are races of headless men; we cannot wonder if the savage, lacking knowledge and speaking a rude language, gets the idea that an ancestor named "the Tiger" was an actual tiger. Everywhere the results of such mistakes are to be met with.

172. It follows from this conception of animal-ancestry, that animals are believed to think and understand as men do; and that they are often treated with greater consideration than they would otherwise have; there being a special regard for the animal which gives the tribal name, and which is considered as a relative.

173. If the East Africans think the souls of departed chiefs enter into lions and render them sacred; it may be concluded that sacredness will equally attach to the animals whose human souls were ancestral; and the implication is that there will arise propitiations of the beast-chief who was progenitor of the tribe. Prayers and offerings may be expected to develop into a cult, and the animal namesake into a deity. Mammals, birds, reptiles, fishes, all yield nicknames; are all in one place or other regarded as progenitors; and all acquire, among this or that people, a sacredness rising in many cases to adoration.

174. The foregoing hypothesis also explains the strange worship of beings half-human, half-divine. For if the conquering Radama is described as "a mighty bull," as a king, and as a god, what can be more natural than that he should be represented either as a man, or as a bull, or as a bull-headed man, or as a creature having a bovine body with a human head? Similarly, where the two parents bore different animal names, will not their offspring combine the attributes of both parents?

175. This hypothesis explains also the legends about animal-agency in human affairs; the cases in which the order of genesis is inverted—where beasts and fishes are descended from human originals; the doctrine of metempsychosis and its developments; and those stories of women who have borne animals.

176. In this derivation of animal-worship from the propitiation of ghosts, we have an instance how, by modification upon modification, leading to complications and divergences without limit, evolution brings into being products extremely unlike their germs.

XXIII. PLANT-WORSHIP.

177. Any unusual mental state caused by a nervous stimulant, is attributed by the savage and semi-civilized to the presence of a supernatural being in the solid or liquid swallowed.

178. There follow certain derivative beliefs respecting plants which yield intoxicating liquors. A typical case is furnished by the worship of the Soma. A plant which was crushed between stones, and its juice expressed, filtered, and fermented, producing an intoxicating liquor which was drunk by the priestly devotees. The exhilarating effects of the beverage were attributed to inspiration by a supernatural being, who, nevertheless, was thought to be present in the Soma juice. The conclusion that plants yielding intoxicating agents are thought to contain supernatural

beings, is also borne out by the beliefs which have been held as to the vine and *coca*.

179. The attribution to a plant of a human personality, and its subsequent worship, may arise in other ways. For instance, tribes that have come out of places characterized by particular trees or plants unawares, change the legend of emergence from them into the legend of descent from them: words fitted to convey the distinction not being contained in their vocabularies. Hence the belief that such trees are their ancestors; and that they are sacred.

180. Before passing to the third origin of plant-worship, which, like the third origin of animal-worship, is linguistic, let the reader recall a defect of primitive language—the impossibility for the narrators of legends to express the distinction between a person and the object after which he was named.

181. How the naming of individuals after plants becomes a source of confusion can now be seen. For identification of the two in tradition, can be prevented only by the use of verbal qualifications that are impossible in rude languages; and from this unchecked identification there arise ideas and sentiments respecting the plant-ancestor, allied to those excited by the animal-ancestor, or the ancestor figured as human.

182. Did plant-worship arise from an alleged primeval fetichism—were it one of the animistic interpretations said to result from the tendency of undeveloped minds to ascribe duality to all objects; there would be no explanation of the conceived shape of the plant-spirit. Here then is an indirect proof that plant-worship has arisen in one or other of the ways shown.

183. The ghost-theory, which has supplied us with a key to other groups of superstitions, does not thus fail with the superstitions constituting this group—superstitions otherwise implying gratuitous absurdities which cannot legitimately be ascribed even to primitive man.

XXIV. NATURE-WORSHIP.

184. Under this title it remains to deal with the superstitious beliefs concerning the more conspicuous inorganic objects and powers. Further imperfections in undeveloped speech must here be noted. Statements respecting non-living things and motions, from a lack of words free from implications of vitality, favour personalization. Another cause of misinterpretation arises from the variable use of words; when the same word is employed to mean thunder, the sky, the chief man, or an ordinary ghost, it becomes manifest that personalization of the great natural objects and powers, is not only easy but almost inevitable.

185. The view here held must not be mistaken for that of the mythologists. Contrariwise, it is that the human personality is the primary element; that the identification of this with some natural power or object is due to identity of name; and that the worship of this natural power thus arises secondarily.

186. On remembering that even now among ourselves, a Scotch laird, called by the name of his estate, is verbally identified with it, and might in times when language was vague have readily become confounded in legend with it; and also that at the present time, the word "descend," means either coming down from a higher level or coming down from an ancestor, and depends for its interpretation on the context; it cannot be doubted that mountain-worship in some cases arises from mistaking the traditional source of the race for the traditional parentage of the race. (*Sociology*, § 179.)

187. Ocean-worship seems to have had, in some cases, a parallel genesis. A primitive people on whose shores there arrived unknown men from an unknown source, and who spoke of them as "men of the sea," would be very apt to originate a tradition describing them as coming out of the sea or being produced by it. This belief in descent from the sea as a progenitor might also arise through misinterpretation of individual names.

188. Naming the newly-born from concurrent events, being a primitive practice, the name Dawn has probably often been given to those born early in the morning: that it is a birth name there is clear proof. The traditions concerning one of these who became noted, would, in the mind of the uncritical savage, lead to identification with the Dawn; and the adventures would be interpreted in such manner as the phenomena of Dawn made most feasible. Where Dawn became a tribal name, incongruous genealogies and conflicting adventures would result.

189. Can Stars also become identified with ancestors? When we remember the conception of the heavens as resting on, or adjacent to, the mountain-tops; and that access to them from these adjacent regions, presents no difficulty to the uncritical mind of primitive man; the identification of stars with persons becomes comprehensible. Whence arise the fancies of astrology. The alleged good or ill-fortune of being looked down upon at birth by this or that star, may result from the belief that it is a progenitor of a friendly or unfriendly tribe.

190. Supposed accessibility of the heavens makes similarly easy the identification of the Moon with a man or with a woman. Sometimes the traditional person is believed to reside in the Moon, but more frequently the Sun, Moon, &c., are identified with living beings who once inhabited the earth. An identification possibly caused by the misinterpretation of names; birth-names derived from phases of the Moon being not unusual, and subsequent identifications with the Moon not rare.

191. Naturally, we may expect to find that, in common with the Stars and the Moon, the Sun has been personalized by identification with a traditional human being. One source of these solar myths, is the literal acceptance of figurative statements concerning the quarter whence the race came. We ourselves use the expression "children of the Sun" to races living in the tropics. Much more, then, will the primitive man in his poverty-stricken language, speak of

those coming from the place where the Sun rises as "children of the Sun," or "Indians from the rising Sun." That peoples even so advanced as the Peruvians did so, there is proof. When with this is joined the fact that the Yncas were predominantly worshippers of the Sun as ancestor, there is warrant for concluding that this belief in descent from the Sun resulted from misapprehension of the historical fact that the Ynca-race emerged from the land where the Sun rises. The misinterpretation of individual names is also a source of solar myths; for there are facts showing that among primitive peoples speaking more figuratively than we do, and greatly given to flattery, "the Sun" is a frequent name of laudation. As another source we have the birth-name, such as the rising Sun, the soaring Sun, the setting Sun, according to the hour of birth. Manifestly it would be anomalous were celestial incidents thus used, with the exception of the most striking one.

192. In the legend of the victorious Ramses, king, conqueror, bull, sun, and eventually god, there are the elements which, in an earlier stage of civilization, would generate a solar myth like that of Indra. To say that when orally transmitted for generations among a less advanced people, a story such as this would not result in a human biography of the Sun, is to deny a process congruous with the processes going on; and is to assume an historical accuracy that was impossible with a language which could not distinguish between a name and the act of naming.

193. Nature-worship, like each of the worships previously analyzed, is a form of ancestor-worship; but one which has lost, in a still greater degree, the external characters of its original.

XXV. DEITIES.

194. The Evolution of that class of deities which have arisen by simple idealization and expansion of human personalities, remains now to be dealt with.

195. The savage thinks anything which transcends the ordinary is supernatural or divine. Hence, applying the title god to anything new, strange, or extraordinary, he naturally uses it for powerful persons, living and dead, of various kinds.

196. Mention may first be made of those individuals whose superiorities are the least definite—individuals who are regarded by others, or by themselves, as better than the rest.

197. If the superior and the divine are equivalent ideas, the chief or ruler will tend to become a deity during his life and a greater deity after his death. An inference which is justified by facts.

198. As, at first, the divine means simply the superior, men otherwise distinguished than by chieftainship, will be regarded as gods. While there is but little direct evidence that medicine-men, whose predominance has no other origin than their craft, are treated as gods during their lives, there is proof that they are deified after death. Indeed, some facts raise the suspicion that their ghosts are the first which grow into predominance as beings to be feared. Between the medicine-man and the teacher of new arts, there is but a nominal distinction; even the blacksmith is a kind of magician to the African. Hence are found deifications of those whose superiority was shown by their greater knowledge or skill. In illustration of this may be named the many Greek and Roman deities who are described as teachers of one or other new process, or inventors of this or that new appliance.

199. At the present time it occasionally happens that Europeans, such as shipwrecked sailors, thrown among savage peoples, gain ascendency over them by the knowledge and skill they display; and when it is remembered that after the deaths of such men, their powers, exalted in legend, make their ghosts feared more than ordinary ghosts, another source from which deities may arise may be recognized. In some cases the remarkable strangers who thus become a people's

gods, are regarded as the returned ghosts of their own remarkable men.

200. From this deification of single men of higher races, there is a natural transition to the deification of conquering races, not individually but bodily. The expression "gods and men," occurring in the traditions of various peoples is thus made readily interpretable. For when savages who call themselves "men" are conquered by savages otherwise called, but proved by the conquest to have that superiority which in the primitive mind is equivalent to divinity, the names of conquering and conquered, will become equivalent in their meanings to "gods and men."

201. On comparing the pantheon of the Greeks with the pantheon of another race—say that of the Fijians, the foregoing hypothesis is found to fit the facts better than that of the mythologists. Anyone who objects to the comparison as insulting, needs only to be reminded that cannibalism was ascribed by the Greeks to some of their deities; and that human sacrifices to Zeus were continued down to late times.

202. Must we recognize a single exception to the general truth thus far verified everywhere? While among all races in all regions the conceptions of deities have been naturally evolved in the way shown; must we conclude that a small clan of the Semitic race had given to it supernaturally, a conception which, though superficially like the rest, was in substance absolutely unlike them? Were we to pursue the methods of science, to disregard foregone conclusions, and to deal with the Hebrew conception as with all others, we could not but conclude that it had had a kindred genesis with other like conceptions. The conception of the Deity formed by Abraham, is identical with that of his modern representative—the wandering Semite of the present day—and with that of the uncivilized in general.

203. And so the universality of anthropomorphism has the sufficient cause that the divine man as *con*ceived, had everywhere for antecedent a powerful man as *per*ceived.

Instead of its being true that ideas of deity such as are entertained by cultivated people, are innate; it is, contrariwise, true that they arise only at a comparatively advanced stage, as results of accumulated knowledge, greater intellectual grasp, and higher sentiment.

204. Behind the supernatural being of this order, as of all other orders, there has been in every case a human personality. Using the phrase ancestor-worship in its broadest sense, as comprehending all worship of the dead, be they of the same blood or not, ancestor-worship is the root of every religion.

XXVI. THE PRIMITIVE THEORY OF THINGS.

205. How natural is the evolution of the primitive man's system of thought, will be perceived on now recapitulating, in the briefest way, the results reached in the foregoing eighteen divisions.

206. Changes in the sky and on the earth foster the notion of duality; which is confirmed by shadows and echoes; dreams and somnambulism; and favoured by such abnormal insensibilities as swoon, and apoplexy; which temporary forms of unconsciousness, become linked with that lasting kind of unconsciousness from which the double cannot be brought back at all—with death. The belief that these doubles of dead men are the causes of all strange and mysterious things, lead primitive men to guard themselves from them by the aid of exorcists and sorcerers, or to propitiate them by prayers and praises. From which latter observances every other kind of worship has arisen. Besides the aberrant developments of ancestor-worship which result from identification of ancestors with idols, animals, plants, and natural powers, there are the direct developments of it. Within the tribe the chief, the magician, or some one otherwise skilled, held in awe during his life as showing powers of unknown origin and extent, is feared in a higher degree when, after death, he gains the further powers possessed by

all ghosts. Still more the stranger bringing new arts, as well as the conqueror of superior race, is treated as a superhuman being during life, and afterwards worshipped as a yet greater superhuman being. Thus, setting out with the wandering double which the dream suggests; passing to the double that goes away at death; advancing from this ghost, at first supposed to have but a transitory second life, to ghosts which exist permanently and therefore accumulate; the primitive man is led gradually to people surrounding space with supernatural beings, small and great, which become in his mind causal agents for everything unfamiliar. And in carrying out the mode of interpretation initiated in this way, he is committed to the ever-multiplying superstitions we have traced out.

207. How orderly is the genesis of these beliefs, will be seen on now observing that the general formula of Evolution is conformed to by the changes gone through. Undeniably, a system of superstitions evolves after the same manner as all other things. By continuous integration and differentiation, it is formed into an aggregate which, while increasing, passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity. This correspondence is, indeed, inevitable. The law which is conformed to by the evolving human being, and which is consequently conformed to by the evolving human intelligence, is of necessity conformed to by all products of that intelligence.

XXVII. THE SCOPE OF SOCIOLOGY.

208. The reason for including in the foregoing Data, so much of what forms a part of Sociology itself, is that in no case can the data of a science be stated before some knowledge of the science has been reached.

209. The general conclusion reached may now be appropriately stated. It is that while the conduct of the primitive man is in part determined by the feelings with which he regards men around him; it is in part determined by the

feelings with which he regards men who have passed away. While *the fear of the living* becomes the root of the political control, *the fear of the dead* becomes the root of the religious control.

210. Setting out with social units conditioned and constituted as we have described, the Science of Sociology has to give an account of all the phenomena that result from their combined actions. Commencing with the development of the family, Sociology has next to describe and explain the rise and development of political organization; the evolution of the ecclesiastical structures and functions; the control embodied in ceremonial observances; and the relations between the regulative and the operative divisions of every society. These developments having been disclosed, it has next to follow out those associated developments which aid, and are aided by, social evolution—the developments of language, knowledge, morals, and æsthetics. Finally, having to consider the interdependence of structures, functions, and products, taken in their totality. The highest achievement in Sociology is so to grasp the vast heterogeneous aggregate, as to see how the character of each group at each stage is determined, partly by its own antecedents, and partly by the past and present actions of the rest upon it.

211. Ending preliminaries, let us now see into what empirical generalizations the facts of Sociology may be arranged.

CHAPTER XIX.

THE INDUCTIONS OF SOCIOLOGY,

"General facts, structural and functional, as gathered from a survey of Societies and their changes: in other words, the empirical generalizations that are arrived at by comparing different societies, and successive phases of the same society."

I. WHAT IS A SOCIETY?

212. A society is an entity; for, though formed of discrete units, a certain concreteness in the aggregate of them is implied by the general persistence of the arrangements among them throughout the area occupied.

213. The attributes of a society being like those of a living body, the reasons have now to be considered for asserting that the permanent relations among the parts of a society, are analogous to the permanent relations among the parts of a living body.

II. A SOCIETY IS AN ORGANISM.

214. The first trait for regarding a society as an organism, is that it undergoes continuous growth.

215. As a society grows, its parts become unlike: it exhibits increase of structure.

216. This community will be more fully appreciated on observing that progressive differentiation of social structures is accompanied by progressive differentiation of social functions.

217. The functions are not simply different, but their

differences are so related as to make one another possible. This reciprocal aid causes mutual dependence of the parts. And the mutually-dependent parts, living by and for one another, form an aggregate constituted on the same general principle as is an individual organism. In respect of the "physiological division of labour" a social organism and an individual organism are entirely alike.

218. How the combined actions of mutually-dependent parts constitute life of the whole, and how there hence results a parallelism between social life and animal life, we see still more clearly on learning that the life of every visible organism is constituted by the lives of units too minute to be seen by the unaided eye. On seeing this, there is less difficulty in regarding a nation of human beings as an organism.

219. The relation between the lives of the units and the life of the aggregate, has a further character common to the two cases. By a catastrophe the life of the aggregate may be destroyed without immediately destroying the lives of all its units; while, on the other hand, if no catastrophe abridges it, the life of the aggregate is far longer than the lives of its units. The life of the whole is quite unlike the lives of the units; though it is a life produced by them.

220. From these likenesses between the social organism and the individual organism, we must turn to an extreme unlikeness. The parts of an animal form a concrete whole; but the parts of a society form a whole which is discrete. While the living units composing the one are bound together in close contact, the living units composing the other are free, are not in contact, and are more or less widely dispersed.

221. How, then, can there be any parallelism? Though discrete instead of concrete, the social aggregate is rendered a living whole by emotional and intellectual language; it is by this agency that the mutual dependence of parts which constitutes organization is effectually established.

222. We now arrive at a cardinal difference in the two

kinds of organisms. In the one, consciousness is concentrated in a small part of the aggregate. In the other, it is diffused throughout the aggregate: all the units possess the capacities for happiness and misery in approximately equal degrees. As there is no social sensorium, the welfare of the aggregate, considered apart from that of the units, is not an end to be sought.

223. Having thus stated in their most general forms the reasons for regarding a society as an organism, let us follow out the comparison in detail.

III. SOCIAL GROWTH.

224. Societies, like living bodies, begin as germs—originate from masses which are extremely minute in comparison with the masses which some of them eventually reach.

225. The growths in aggregates of different classes are extremely various in their amounts. We may see this in the animal kingdom, on glancing at the members of the *Protozoa* and *Vertebrata;* and in societies, when we glance at the Wood-Veddahs, living sometimes in pairs, and at those highest societies consisting of aggregated millions.

226. In each case, also, size augments by two processes, which go on sometimes separately, sometimes together. There is increase by simple multiplication of units, causing enlargement of the group; there is increase by union of groups, and again by union of groups of groups. Social growth proceeds by a compounding and re-compounding analogous to that treated of in *Biology*, §§ 180-211, where organic integration was traced up from the lowest plants to the shoot with its foliar organs; and from the smallest animals up to the members of the *Annulosa*. The primitive social group, like the primitive group of living molecules with which organic evolution begins, never attains any considerable size by simple increase. The formation of a larger society results only by the joining of smaller socie-

ties; a process which may be seen now going on among uncivilized races, as it once went on among the ancestors of the civilized races. Repetition of this process on a larger scale makes secondary aggregates into tertiary ones.

227. There is yet another analogy. Social growth shows the fundamental trait of evolution under a twofold aspect: integration being displayed both in the formation of a larger mass, and in the progress of such mass towards that coherence due to closeness of parts.

IV. SOCIAL STRUCTURES.

228. In societies, as in living bodies, increase of mass is habitually accompanied by increase of structure. As we progress from small groups to larger; from simple groups to compound groups; and from compound groups to doubly-compound ones; the unlikenesses of parts increase. The social aggregate, homogeneous when minute, habitually gains in heterogeneity along with each increment of growth. To reach great size, great complexity is needful.

229. Beyond unlikenesses of parts due to development of the co-ordinating agencies, there presently follow unlikenesses among the agencies co-ordinated—the organs of alimentation, etc., in the one case, and the industrial structures in the other.

230. These differentiations, in both cases, proceed from the more general to the more special. First broad and simple contrasts of parts; then within each of the parts primarily contrasted, changes which make unlike divisions of them; then within each of these unlike divisions, minor unlikenesses; and so on continually. The transformation of the homogeneous into the heterogeneous, characterizes the evolution of individual and social organisms in especially high degrees.

231. Organs in animals and organs in societies have internal arrangements framed on the same principle. Each viscus contains appliances for bringing nutriment, for

carrying away the product, and for regulating its activity. And the clustered citizens forming an organ which produces some commodity for national use, has within it subservient structures substantially like those of each other organ carrying on each other function.

232. One more structural analogy must be named. In animals of low types, no organ, strictly so-called, exists; but only a number of units not yet aggregated into an organ. A stage analogous to that incipient form of an industrial structure in a society, where each worker carries on his occupation alone, and himself disposes of the product to consumers. Passing to the second type of individual organ—the compact cluster of cells—we find a social type closely corresponding to it, in the related families who formerly monopolized each industry, and formed a cluster habitually occupying the same locality. Thirdly, that increase of a glandular organ necessitated by the more active functions of a more developed animal, where there is a change of structure consequent on augmentation of bulk, is paralleled by the gradual transition from the household-type to the factory-type.

233. Finally, in both cases, there is a contrast between the original mode of development and a substituted later mode. The stages of evolution are greatly abridged, and organs are produced by comparatively direct processes. In addition to this, entire organs which, during the serial genesis of the type, came comparatively late, come, alike in the evolving individual and society, comparatively soon.

V. SOCIAL FUNCTIONS.

234. We come now to those functional traits which are not manifestly implied by traits of structure.

235. As evolution advances, the *consensus* of functions in the individual and the social organism becomes closer. When a Rhizopod is accidentally divided, each division goes on as before. A headless wandering group of primitive

men also divides without any inconvenience. With highly-organized aggregates however it is very different. We cannot cut a mammal in two without causing immediate death. Middlesex separated from its surroundings would, in a few days, have all its social processes stopped by lack of supplies.

236. Another corollary must be named. In proportion as the units forming any part of an individual organism are limited to one kind of action, as that of absorbing, or secreting, or contracting, or conveying an impulse, and become adapted to that action, they lose adaptation to other actions. And in the social organism the discipline required for effectually discharging a special duty, causes unfitness for discharging special duties widely unlike it.

237. Let us bear in mind that with the advance of organization, every part, more limited in its office, performs its office better; and that the total activity we call life, individual or national, augments with it.

VI. SYSTEMS OF ORGANS.

237*a*. As with individual organisms so with social organisms; however unlike they finally become, they begin their developments in like ways.

238. We have seen (*First Principles*, § § 149-152, and *Biology*, § § 287-9) the primary organic differentiations which arise in correspondence with the primary contrasts of conditions among the parts, as outer and inner. The early stages which occur in the evolution of social organisms are analogous in principle. There are the masters who, as warriors carry on the offensive and defensive activities and thus especially stand in relation to environing agencies; and the slaves who carry on inner activities for the general sustentation, primarily of their masters and secondarily of themselves.

239. After the outer and inner systems have been marked off from one another, the distributing system, lying between

the two, begins to develop and facilitates their co-operation. It will be sufficient to note, passing over the individual distributing system, that the lowest social types have no distributing systems—no roads or traders exist; but, with the localization of industries, appliances for transferring commodities begin to show themselves.

240. Moreover, these systems arise in the social organism in the same order as in the individual organism; and for the same reasons. After the class of masters and the class of slaves has developed, a larger society can grow and complicate only on condition that the transferring system makes proportionate advances. Let us trace out the evolution of each of these three systems.

VII. THE SUSTAINING SYSTEM.

241. The parts carrying on alimentation in a living body, and the parts carrying on productive industries in the body politic, constitute, in either case, a sustaining system. In the digestive system of an animal the foreign substances serving for sustentation, on which its interior operates, determine the general and special characters of that interior. And so with the industrial system of a society; its activities and correlative structures are determined by the minerals, animals, and vegetals, with which its workers are in contact; and its industrial specializations are determined by differences in the local products those parts have to deal with.

242. There is a further common trait. Alimentary structures differentiate and develop in a manner quite unlike that followed by regulating structures. As the alimentary organs in the higher *Annulosa* have entirely lost their original relations to the segments or somites; so the industrial structures which arise in a large society, formed by permanent consolidation of small societies, extend themselves without reference to political divisions, great or little.

243. The significance of the antithesis, that while the

material environment determines the industrial differentiations, it does not determine the regulative or governmental structures, will be pointed out when the evolution of these latter are traced.

VIII. THE DISTRIBUTING SYSTEM.

244. We have next to observe the parallelisms between the individual and the social distributing systems, in their successive stages.

245. In both cases, so long as there is little or no differentiation of parts, there is little or no need for channels of communication among the parts; neither is there any demand for appliances for transfer when the unlike parts are in close contact. But when the division of labour, physiological or sociological, has so far progressed that parts at some distance from one another co-operate, the growth of channels of distribution—the vascular system in considerably developed animals, and the roads and railways in considerably developed societies—with agents effecting distribution, becomes necessary; and the development of the distributing system has to keep pace with the other developments.

246. A like necessity implies a like parallelism between the progressing circulations in the two cases. Feeble activities, small amounts of exchange, and obstacles to transfer, unite in preventing at first anything more than very slow and irregular repletions and depletions, now at one place now at another. But with an increased amount of general life, there goes an increased need for large distributions in constant directions. Hence, irregular, weak, and slow movements at long intervals, are changed into a regular rapid rhythm by strong and unceasing local demands.

247. With the advance of the aggregate, individual or social, to a greater heterogeneity, there goes advancing heterogeneity in the circulating currents; which at first

containing few crude matters, contain at last many prepared matters. In both cases, too, structures which elaborate the requisites for sustentation, stand to these currents in like relations—take from them the raw materials on which they have to operate, and directly or indirectly deliver into them again the products; and in both cases these structures, competing with one another for their share of the circulating stock of consumable matters, are enabled to appropriate, to repair themselves, and to grow, in proportion to their performances of functions.

248. Of course, along with these likenesses there go differences, due to the contrast between the concreteness of an individual organism and the discreteness of a social organism. Differences which do but qualify the essential likenesses. The truth we have to carry with us is that the distributing system in both organisms has its development determined by the necessities of transfer among interdependent parts. Lying between the two original systems, its structure becomes adapted to the requirements of the carrying function between them as wholes, and between the sub-divisions of each.

IX. THE REGULATING SYSTEM.

249. How the evolution of the structures carrying on outer actions is determined by the environment, has now to be seen. How the regulating and expending systems, the nervo-motor in the one case, and the governmental-military in the other, are developed.

250. Successive improvements of the organs of sense and motion, and of the internal co-ordinating apparatus which uses them, have indirectly resulted from the antagonisms and competitions of organisms with one another. And everywhere the wars between societies originate governmental structures, and are causes of all such improvements in those structures as increase the efficiency of corporate action against environing societies. The induction here to

be remembered is, that as in the individual organism that nervo-muscular apparatus which carries on conflict with environing organisms, begins with, and is developed by, that conflict; so the governmental-military organization of a society, is initiated by, and evolves along with, the warfare between societies. Or, to speak more strictly, there is thus evolved that part of its governmental organization which conduces to efficient co-operation against other societies.

251. The subordination of local governing centres to a general governing centre, accompanies co-operation of the components of the compound aggregate in its conflicts with other like aggregates. So long as the subordination is established by internal conflict of the divisions with one another, and hence involves antagonism among them, it remains unstable; but it tends towards stability in proportion as the regulating agents, major and minor, are habituated to combined action against external enemies.

252. This formation of a compound regulating system characterized by a dominant centre and subordinate centres, is accompanied, in both individual and social organisms, by increasing size and complexity of the dominant centre. These high centres in the two cases, are also neither the immediate recipients of information nor the immediate issuers of commands; but receive from inferior agencies the facts which guide their decisions, and through other inferior agencies get those decisions carried into execution. Again, during evolution of the supreme regulating centres, individual and social, the older parts become relatively automatic.

253. For co-ordinating the actions of an aggregate, individual or social, there must be not only a governing centre, but there must also be media of communication through which this centre may affect the parts. Ascending stages of animal organization carry us from types in which this requirement is scarcely at all fulfilled, to types in which it is fulfilled effectually. Analogous stages in social evolution are sufficiently manifest. What is in its early stage a

slow propagation of impulses from unit to unit throughout a society, becomes, as we advance, a more rapid propagation along settled lines: so making quick and definitely-adjusted combinations possible. By the agency of the telegraph, the social organism, though discrete, has acquired a promptness of co-ordination equal to, and indeed exceeding, the promptness of co-ordination in concrete organisms.

254. In both kinds of organisms the regulating system, during evolution, divides into two systems, to which is finally added a third partially independent system; and the differentiations of these systems have common causes in the two cases. That the two kinds of co-ordination required in the individual organism are widely unlike we may see; for the one has to deal with the outer set of organs treating with the environment, necessitating swift motions, sudden variations of direction, and instant stoppages; and the other has to deal with the inner set of organs which carry on sustentation, where no quick, special, and exact adaptations are required; but only a general proportion and tolerable order among actions which are not precise in their beginnings, amounts, or endings. And so it is with the social organism. Success in conflicts with other societies implies quickness, combination, and special adjustments to ever-varying circumstances; and to these ends there must be a centralized agency that is instantly obeyed. Quite otherwise is it with the structures carrying on sustentation; the several kinds of food and clothing have to meet a consumption which changes within moderate limits only; rapidity, speciality, and exactness, are not required. A third regulating system arises in both cases. That an organ may continue responding to an increased demand, there must be an extra influx of the materials used in its actions—it must have credit in advance of function discharged. An end achieved in the one case by the vaso-motor nervous system; and in the other by the system of banks and associated financial bodies which lend out capital.

255. Co-operation being in either case impossible without

appliances by which the co-operating parts shall have their actions adjusted, it thus inevitably happens that in the body politic, as in the living body, there arises a regulating system; and within itself this differentiates as the sets of organs evolve.

X. SOCIAL TYPES AND CONSTITUTIONS.

256. Primarily, societies may be arranged according to their degrees of composition, as simple, compound, doubly-compound, trebly-compound; and secondarily, though in a less specific way, into the predominantly militant, or predominantly industrial.

257. From the primary classification emerge certain generalizations:—That there are societies of these different grades of composition; that those of the same grade have general resemblances in their structures; and that they arise in similar order. The stages of compounding and re-compounding have to be passed through in succession. Above the simple group the first stage is a compound group inconsiderable in size. The mutual dependence of parts which constitutes it a working whole, cannot exist without some development of lines of intercourse and appliances for combined action; and this must be achieved over a narrow area before it can be achieved over a wide one. When a compound society has been consolidated by the co-operation of its component groups in war under a single head, it becomes practically a single one. By conquest, or by federation in war with other societies of the same order, may be formed societies of the doubly-compound type. And at later stages, by kindred steps, arise still larger aggregates having still more complex structures: In this order has social evolution gone on, and only in this order does it appear to be possible.

258. Passing to the secondary classification, transitional as are nearly all the societies there are to study, we may yet clearly distinguish the constitutional traits of these opposite

types, characterized by predominance of the outer and inner systems respectively.

259. The militant type is one in which the army is the nation mobilized while the nation is the quiescent army, and which, therefore, acquires a structure common to army and nation. The trait characterizing the militant structure throughout, is that its units are coerced into their various combined actions. As the soldier's will is so suspended that he becomes in everything the agent of his officer's will; so is the will of the citizen in all transactions, private and public, overruled by that of the government. The co-operation by which the life of the militant society is maintained, is a *compulsory* co-operation. The social structure adapted for dealing with surrounding hostile societies is under a centralized regulating system, to which all the parts are completely subject; just as in the individual organism the outer organs are completely subject to the chief nervous centre.

260. The traits in which the industrial type differs so widely from the militant type, originate in those relations of individuals implied by industrial activities. All trading transactions, whether between masters and workmen, buyers and sellers of commodities, or professional men and those they aid, are effected by free exchange. This relation, of *voluntary* co-operation, in which the mutual rendering of services is unforced and neither individual subordinated, becomes the predominant relation throughout society in proportion as the industrial activities predominate. Daily determining the thoughts and sentiments, it produces social units whose mental structures and habits mould social arrangements into corresponding forms. And while the developed sustaining system which gives to a social organism the industrial type, acquires for itself, like the developed sustaining system of an animal, a regulating apparatus of a diffused or uncentralized kind; it tends also to decentralize the primary regulating apparatus, by making it derive from more numerous classes its deputed powers.

261. The essential traits of these two social types are obscured by various causes. There is the deeply-organized character of the particular race; the effect of the immediately preceding mode of life and social type; the nature of the habitat; the organizations and practices of surrounding societies; and the mixture of races caused by conquest or otherwise.

262. To the complications caused by crossings of the two classifications set forth, have to be added the complications caused by unions of races widely unlike or little unlike; which here mix not at all, there partially, and in other cases wholly. Respecting these kinds of constitutions, there is considerable warrant for concluding that the hybrid kind, essentially unstable, admits of being organized only on the principle of compulsory co-operation; since units much opposed in their natures cannot work together spontaneously. While, conversely, the kind characterized by likeness in its units is relatively stable; and under fit conditions may evolve into the industrial type: especially if the likeness is qualified by slight differences.

263. With more space, some pages might here be added respecting a possible future social type. A social type which, having a sustaining system more fully developed than any at present existing, will use the products of industry neither for maintaining a militant organization nor exclusively for material aggrandizement; but will devote them to the carrying on of higher activities.

XI. SOCIAL METAMORPHOSES.

264. With social organisms, as with individual organisms, the structure becomes adapted to the activity. If circumstances entail a fundamental change in the mode of activity, there by-and-by results a fundamental change in the form of structure; and there is a reversion towards the old type if there is a resumption of the old activity.

265. When glancing at the social metamorphoses that

follow altered social activities, we must bear in mind those resistances to change which the inherited social type offers, and also those resistances to change caused by partial continuance of old conditions. Further, we must anticipate reversion if the old conditions begin again to predominate.

266. Of chief interest here, are the transformations of the militant into the industrial and the industrial into the militant. That revived belligerent habits re-develop the militant type of structure is evident if we contrast the period from 1815—the commencement of the long peace—to 1850, with the period from 1850 to the present time. We cannot fail to see that in Great Britain, along with increased armaments, more frequent conflicts, and revived military sentiment, there has been a spread of compulsory regulations. While nominally extended by the giving of votes, the freedom of the individual has been in many ways actually diminished; both by restrictions which ever-multiplying officials are appointed to insist on, and by the forcible taking of money to secure for him, or others at his expense, benefits previously left to be secured by each for himself. Undeniably this is a return towards that coercive discipline which pervades the whole social life where the militant type is predominant. It also shows how a partially-developed industrial type retrogrades towards the militant type if international conflicts recur.

267. Of course social metamorphoses are in every case complicated and obscured by special causes never twice alike. As in our own case, for instance, habits, beliefs, and sentiments, have all been altered by the vast transformation suddenly caused by railways and telegraphs.

XII. QUALIFICATIONS AND SUMMARY.

268. One who made the analogies between individual organization and social organization his special subject, might carry them further in several directions. We may now however leave the comparison as it stands.

269. Here let it be once more distinctly asserted that there exist no analogies between the body politic and a living body, save those necessitated by that mutual dependence of parts which they display in common. Though, in foregoing divisions, sundry comparisons of social structures and functions to structures and functions in the human body, have been made, they have been made only because structures and functions in the human body furnish familiar illustrations of structures and functions in general. Community in the fundamental principles of organization is the only community asserted.

270. Comparisons of societies in their ascending grades, have made manifest certain cardinal facts respecting their growths, structures, and functions—facts respecting the systems of structures, sustaining, distributing, and regulating, of which they are composed: respecting the relations of these structures to the surrounding conditions and the dominant forms of social activities entailed; and respecting the metamorphoses of types caused by changes in the activities. The inductions arrived at, constituting in rude outline an Empirical Sociology, show that in social phenomena there is a general order of coexistence and sequence; and that therefore social phenomena form the subject-matter of a science reducible, in some measure at least, to the deductive form.

271. The many facts contemplated unite in proving that social evolution forms a part of evolution at large, for there is progress towards greater size, coherence, multiformity, and definiteness. Guided, then, by the law of evolution in general, and, in subordination to it, guided by the foregoing inductions, we are now prepared for following out the synthesis of social phenomena. Let us begin with those simplest ones presented by the evolution of the family.

CHAPTER XX.

DOMESTIC INSTITUTIONS.

Treating of the maintenance of the human race.

I. THE MAINTENANCE OF SPECIES.

272. That the maintenance of the human species may be clearly comprehended, we must glance at the maintenance of living beings at large.

273. Of every species it is undeniable that individuals which die must be replaced by new individuals, or the species as a whole must die. No less obvious is it that if the death-rate in a species is high, the rate of multiplication must be high, and conversely. This proportioning of reproduction to mortality is requisite for mankind as for every other kind.

274. The requirement that a due number of adults shall arise in successive generations, may be fulfilled in variously modified ways, which subordinate the existing and next succeeding members of the species in various degrees. We must here look at certain special aspects of the antagonism between Individuation and Genesis. (*Biology*, § § 319-51.)

II. THE DIVERSE INTERESTS OF THE SPECIES, OF THE PARENTS, AND OF THE OFFSPRING.

275. That evolution decreases the sacrifice of individual life to the life of the species, we may see on glancing upwards from the microscopic *Protozoa*, where the brief parental life disappears absolutely in the lives of the pro-

geny, to the *Mammalia*, where the greatest conciliation of the interests of the species, the parents, and the young is displayed. An advance which is shown even in the progress from the lower to the higher mammalian types.

276. The material cost of reproduction involves an equivalent subtraction from individual development and activity, for which among low types there is no compensation; but as we ascend through higher types there is an increasing compensation in the shape of parental pleasures.

277. The highest constitution of the family is thus reached when there is such conciliation between the needs of the society and those of its members, old and young, that the mortality between birth and the reproductive age falls to a minimum, while the lives of adults have their subordination to the rearing of children reduced to the smallest possible. The diminution of this subordination takes place in three ways: first, by elongation of that period which precedes reproduction; second, by fewer offspring born, as well as by increase of the pleasures taken in the care of them; and third, by lengthening of the life which follows cessation of reproduction. Let us bear in mind that the domestic relations which are ethically the highest, are also biologically and sociologically the highest.

III. PRIMITIVE RELATIONS OF THE SEXES.

278. The propriety of setting out with the foregoing purely natural-history view, will be evident on learning that among low savages the relations of the sexes are substantially like those common among inferior creatures. There are no guides save the passions of the moment, checked only by fears of consequences.

279. There are many facts to show that the relations of the sexes were originally unregulated by the institutions and ideas we commonly regard as natural. The earliest marriage-ceremony was merely a formal commence-

ment of living together, implying a preceding time when the living together began informally.

280. Absence of the ideas and feelings which we consider appropriate to marriage, is further shown by the prevalence in rude societies of practices which are to us in the highest degree repugnant. Various of the uncivilized and semi-civilized display hospitality by furnishing guests with temporary wives. Savages habitually thus give their wives and daughters. Akin is the feeling shown by placing little or no value on chastity in the young.

281. Still more are we shown that regular relations of the sexes are results of evolution, and that the sentiments upholding them have been gradually established, on finding how little regard is paid by many uncivilized and semi-civilized peoples to those limitations which blood-relationships dictate to the civilized. Connexions which we condemn as in the highest degree criminal, are not infrequent; and incest is common among numerous peoples.

282. While facts show the general association between the rudest forms of social existence and the most degraded relations of the sexes; the evidence does not allow the inference that advance in the forms of the sexual relations and advance in social evolution, are constantly and uniformly connected.

283. Nevertheless, comparison of the extremes unquestionably shows that progress towards higher social types is joined with progress towards higher types of domestic institutions.

IV. EXOGAMY AND ENDOGAMY.

284. Before considering the several kinds of sexual relations, a previous question must be considered—Whence come the united persons? Are they of the same tribe or of different tribes? Or are they sometimes one and sometimes the other? In his ingenious and interesting work on

Primitive Marriage—republished in *Studies in Ancient History*—the words "Exogamy" and "Endogamy" are used by Mr. M'Lennan to distinguish the two practices of taking to wife women belonging to other tribes, and taking to wife women belonging to the same tribe. While unquestionably many of the phenomena Mr. M'Lennan describes exist, we shall find reason for doubting his theory taken as a whole. Let us consider, first, the minor objections.

285. Assuming with Mr. M'Lennan that wife-stealing led to exogamy, he is not justified in alleging that female infanticide, and consequent scarcity of women, led to wife-stealing. At first sight it appears undeniable that the frequent destruction of infant girls must have been accompanied by deficiency of adult females; but tribes in a state of chronic hostility are constantly losing their adult males. Hence the killing many female infants merely prevents an excess of women. How inadmissible is the assumption, becomes conspicuous on finding that where wife-stealing is now practised, it is commonly associated with polygyny. The fact that polyandry does not distinguish wife-stealing tribes, likewise militates against the position that female infanticide "rendering women scarce, led at once to polyandry within the tribe, and the capturing of women from without." (*Studies*, p. 75.)

286. Mr. M'Lennan contends that the scarcity of women caused by female infanticide, compelled wife-stealing in primitive homogeneous groups; and he thinks that this happened "at a certain stage among every race of mankind." (*Studies*, p. 75.) Consideration will show, however, that were exogamy prevalent among many tribes forming a cluster, it would not remedy the scarcity of wives, for what one tribe would get another must lose.

287. A more satisfactory theory of the origin of exogamy may be found from the hostility of primitive groups of men. In all times and places, victory is followed by pillage, and women being prized are carried off along with other movables. Women-stealing becomes an incident of suc-

cessful war; and the possession of a wife taken in war becomes a badge of social distinction. What must result? If, as is the case, the test of deserving a wife is in some cases obtainment of a trophy, what more natural than that the trophy should often be the stolen wife herself? And that, where many warriors of a tribe are distinguished by stolen wives, the stealing of a wife should become the required proof of fitness to have one? Hence a peremptory law of exogamy.

288. Can the great prevalence of the form of capture in marriage ceremonies be thus accounted for? As there still exist tribes in which men fight for possession of women, the taking possession of a woman naturally comes as a sequence to an act of capture. Another origin of the form of capture is feminine opposition—primarily of the woman herself, and secondarily of her female friends; since a savage makes his wife a slave, and treats her brutally, her opposition may be expected. The male members of her family also are likely to be opponents; for, from the lowest to the highest stages of social progress, we find a tacit or avowed claim to her services by her father. This leads to the making of compensation to escape vengeance; to the giving of presents beforehand; and eventually to the system of purchase. There are thus three conspiring causes.

289. How endogamous tribes are as numerous as exogamous, and some tribes both endogamous and exogamous, will now be easily seen. Warfare being needful for the taking of women from other tribes, a primitive peaceful group must be endogamous. Among tribes not differing much in strength there will be continual warfare, and both native wives and wives taken from other tribes will be found. Should one tribe, however, gain predominance, the possession of a stolen wife will become a mark of bravery; endogamy will lose caste, and the tribe will become exogamous.

290. Endogamy, which at the outset must have charac-

terized the more peaceful groups, and which has prevailed as societies have become less hostile, must be regarded as a concomitant of the higher forms of the family.

V. PROMISCUITY.

291. Coming now to the several kinds of sexual relations, we find that, in low societies, the wills of the stronger, unchecked by political and moral restraints, determine all behaviour. Men recognize no tie between the sexes save that which might establishes and liking maintains.

292. Several writers would imply that the primitive condition was one of absolute hetairism. The evidence however is hardly sufficient to show this. The impulses which lead primitive men to monopolize such objects as their weapons and implements, their decorations, and their dresses, must lead them to monopolize women. Hence, we cannot but infer that even in prehistoric times, promiscuity was checked by the establishment of individual connexions, prompted by men's likings and maintained against other men by force.

293. If promiscuity is extensive, and if there are more children born to unknown fathers than to known fathers, the connexion between mother and child being the more obvious, there must arise a habit of thinking of maternal kinship rather than of paternal kinship.

294. The effect of Promiscuity is to hinder social evolution. In proportion to its prevalence, there must be paucity and feebleness of relationships. There can be no settled political control. And its unfavourableness to the welfare of offspring scarcely needs pointing out, for where paternity is not recognized, children must depend almost wholly on maternal care. While to parents the absence of the higher gratifications accompanying family life, must be an evil.

295. If, as we concluded, prevailing promiscuity was from the first accompanied by unions having some duration —if, as we may infer, the product of such unions were

likely to be superior to others; then the average result must have been the predominance of such offspring.

296. From this primitive stage, domestic evolution takes place in several directions by increase of coherence and definiteness.

VI. POLYANDRY.

297. Promiscuity may be called indefinite polyandry joined with indefinite polygyny; and one mode of advance is by a diminution of the indefiniteness.

298. From promiscuity we pass to that form of polyandry in which the unrelated husbands have but one wife; thence to the form in which the husbands are related; and finally to the form in which they are brothers only, as in the fraternal polyandry of the Ancient Britons.

299. Polyandry must be regarded as one of the kinds of marital relations emerging from the primitive unregulated state; and one which has survived where competing kinds, not favoured by the conditions, have failed to extinguish it.

300. It is almost needless to point out that as, in passing from promiscuity to polyandry, the domestic relations become more coherent and definite, so do they in passing from the lower forms of polyandry to the higher.

301. What is the effect of polyandry on social self-preservation, on the rearing of offspring, and on the lives of adults? It would seem that just as there are habitats in which only inferior forms of animals can exist, so in societies physically conditioned in particular ways, the inferior forms of domestic life survive because they alone are practicable. With a greatly restricted food-supply the inferior fertility of polyandry would be advantageous.

302. Why polyandry, once common, has decreased, may now be seen. Save where restricted food-supply rendered multiplication disadvantageous, polyandric societies, producing fewer members available for offence and defence, would naturally give way before societies having family-

arrangements more favourable to increase, and with a greater family and social cohesion.

303. Of the several forms of polyandry, we must say that they have evolved, have survived, or have been extinguished, according as the aggregate of conditions has determined.

VII. POLYGYNY.

304. Education, especially the Hebrew history of childhood, has prepared us for learning without astonishment that polygyny is common in every part of the world not occupied by the most advanced nations. It must not be thought, however, that polygyny can be carried to the extent that is habitually said or implied. The number of women could not be sufficiently great to allow it. In polygynous societies the polygyny prevails only among the wealthier or the higher in rank. In most cases where it exists, monogamy coexists to a greater extent.

305. The prevalence of polygyny is easily understood. For the superiority of certain men which made them warriors and chiefs, would also give them more power of securing women. Hence the possession of several wives would come to be regarded as an honour and as a mark of social *status*. Since in every society the doings of the powerful and the wealthy furnish the standards of right and wrong, the plurality of wives would acquire, in places where it prevails, an ethical sanction. From the beginning, too, except in some regions where the labour of women could not be utilized, one motive for desiring many wives would be the desire for many slaves.

306. That polygyny is better than promiscuity needs no proof; and there are several reasons for concluding that it is better than polyandry.

307. The effects of polygyny are, that it conduces in a higher degree to social self-preservation than the inferior types of marital relations, by making possible more rapid re-

placement of men lost in war, and so increases the chance of social survival. By establishment of descent in the male line it conduces to political stability; and, by making possible a developed form of ancestor-worship, it consolidates society. On the lives of adults its effects are not in all respects bad; for where women cannot support themselves, while the number of men is deficient, polygyny may prevent some of them remaining uncared for, and leading miserable lives. Polygyny, however, greatly represses those higher emotions fostered by associations of the sexes. There is a lack of aid prompted by domestic affection, and hence an early close to a miserable old age.

308. The decay of polygyny may be regarded as in part produced by those modifications which more and more elevated one of the wives, and reduced the rest to a relatively servile condition, passing gradually into a condition less and less authorized.

309. Thus, while the polygynous type of family is higher than the types so far considered; while in some cases it diminishes juvenile mortality and the mortality of surplus women; it repeats within the household the barbarism characterizing the life outside the household.

VIII. MONOGAMY.

310. Given a state preceding all social arrangements, and unions of individual men with individual women must have arisen among other kinds of unions. We may infer that enduring monogamic unions were established by slow stages only.

311. Of the aids tending to establish monogamy, one is a more developed conception of property, with consequent usages of barter and purchase; and another, the progress towards equalization of the sexes in numbers, following decrease in warfare.

312. That the monogamic family is the most evolved, follows from the greater cohesion caused by its more

numerous ties; and also by the absence of those repulsions resulting from the jealousies inevitable in the polygynic family.

313. How the interests of the society, of the offspring, and of the parents, are severally better subserved by monogamy during those later stages of social evolution characterized by it, needs pointing out only for form's sake.

314. We may conclude that monogamy is the natural form of sexual relation for the human race. It is implied in all the ideas and sentiments now associated with marriage.

IX. THE FAMILY.

315. Are different forms of domestic arrangement associated with the militant system of organization, and with the industrial system of organization? Considering the many factors which have co-operated in modifying marital arrangements—considering also that some societies, becoming relatively peaceful, have long retained in large measure the structures acquired during previous greater militancy, while other societies which have considerably developed their industrial structures have again become predominantly militant, causing mixtures of traits; the connexions between polygyny and the militant type, and between monogamy and the industrial type, are as clear as can be expected. That advance from the primitive predatory type to the highest industrial type, has gone along with advance from prevalent polygyny to exclusive monogamy, is unquestionable; and that decline of militancy and rise of industrialism have been the essential causes of this change in the type of family, is shown by the fact that this change has occurred where such other supposable causes as culture, religious creed, etc., have not come into play.

316. The domestic relations thus far dealt with mainly under their private aspects, have now to be dealt with under their public aspects. For, on the structure of the

family, considered as a component of a society, depend various social phenomena.

317. These remarks are introductory to a criticism on the doctrines of Sir Henry Maine. While utilizing the evidence furnished by barbarous peoples belonging to the higher types of man, he has ignored the great mass of the uncivilized, and disregarded the multitudinous facts they present at variance with his theory. He rightly blames earlier writers for not exploring a sufficiently wide area of induction, an error, however, which he himself falls into when he says that "the implicit obedience of rude men to their parent is doubtless a primary fact" (*Ancient Law.* 1861. 136). For, so far from showing that filial obedience is innate, and the patriarchal type a natural consequence, the evidence points rather to the inference that the two have evolved hand in hand under favouring conditions.

318. Sir Henry Maine implies that in the earliest stages there were definite marital relations. In the divisions on "The Primitive Relations of the Sexes," on "Promiscuity," and on "Polyandry," it has been shown, however, that definite coherent marital relations are preceded by indefinite incoherent ones. Sir H. Maine further assumes that descent has always and everywhere been in the male line. That it has from the recorded times of those peoples with whom he deals may be true. But with the uncivilized all over the world, descent in the female line is common. Again, the existence of government from the beginning is postulated—patriarchal authority over wife, children, slaves, and all who are included in the primitive social group. In the divisions on "The Regulating System" and "Social Types," we have seen, however, that in many parts of the world there are social groups which show this assumption to be erroneous. Evidence again negatives another component of his doctrine, that originally, property is held by the family as a corporate body. And also the belief in the perpetual tutelage of women.

319. And here we come in face of the fact, before

obliquely glanced at, that Sir H. Maine's hypothesis takes account of no stages in human progress earlier than the pastoral or agricultural. The groups he describes as severally formed of the patriarch, his wife, descendants, slaves, flocks, and herds, are groups implying domesticated animals of several kinds. But before the domestication of animals was achieved, there passed long stages stretching back through pre-historic times. To understand the higher forms of the family we must trace them up from those lowest forms accompanying the lowest social state. Were this to be done, it would be evident how, in a small separated group of persons old and young, held together by some kinship, there was, under the circumstances of pastoral life, an establishing of male descent, an increasing of cohesion, of subordination, of co-operation, industrial and defensive; and that acquirement of structure became relatively easy, because domestic government and social government became identical. Hence the genesis of a simple society more developed than all preceding simple societies, and better fitted for the composition of higher societies. Thus originated under special conditions, the patriarchal group with its adapted ideas, sentiments, customs, arrangements, dividing in successive generations into sub-groups which, held together in larger or smaller clusters according as the environment favoured, carried its organization with it into the settled state; and the efficient co-ordination evolved within it, favoured efficient co-ordination of the larger societies formed by aggregation.

320. From this criticism let us now turn to one general truth of profound significance which Sir H. Maine brings into view—the disintegration of the family. "The *unit* of an ancient society was the Family," he says, and "of a modern society the Individual." When individuals of the family, no longer working together only in their unlike relations to one another, come to work together under like relations to State-authority and to enemies, the public co-operation and subordination grow at the expense of the

private co-operation and subordination. As in the higher individual organisms the aggregated cells which form the embryo, give place to structures in which the cell-form is almost lost; so in the social organism, the family groups give way to structures formed of mingled individuals belonging to many different stocks.

321. Is there any limit to this disintegration? In modern nations this disintegration has partially dissolved the relations of domestic life and substituted for them the relations of social life. Not simply have the individual claims and responsibilities of young adults in each family, come to be recognized by the State; but the State has, to a considerable degree, usurped the parental functions in respect of children, and, assuming their claims upon it, exercises coercion over them. We must conclude, however, that this degree of family disintegration is in excess, and will hereafter be followed by partial re-integration.

322. And here a truth comes in sight on which politicians and philanthropists would do well to ponder. To survive, every species of creature must fulfil two conflicting requirements. During infancy each member must receive benefits in proportion to its incapacity; but when mature it must receive benefits in proportion to its capacity. The species would disappear in a generation were parents not to conform to this law of the immature; and similarly with the law of the mature, for were prosperity not to vary with efficiency, the least worthy adults would displace the most worthy.

323. Thus, into communities produced by multiplication of it, the patriarchal group, carrying its supremacy of the eldest male, its system of inheritance, its laws of property, its joint worship of the common ancestor, its blood feud, and its complete subjection of women and children, long retains its individuality. But with these communities, as with communities otherwise constituted, combined action slowly leads to fusion; the lines of division become gradually less marked; and at length, as Sir Henry Maine shows, societies which have the family for their unit of

composition pass into societies which have the individual for their unit of composition.

X. THE *STATUS* OF WOMEN.

324. Perhaps in no way is the moral progress of mankind more clearly shown, than by contrasting the position of women among savages with their position among the most advanced of the civilized. At one extreme a treatment of them cruel to the utmost degree bearable; and at the other extreme a treatment which, in some directions, gives them precedence over men.

325. Recognizing the truth that as long as women continue to be stolen or bought, their human individualities are ignored; let us observe the division of labour that results between the sexes; determined partly by the unqualified despotism of men and partly by the limitations which certain incapacities of women entail.

326. Omitting those activities for which women are, during large parts of their lives, physically incapacitated, or into which they cannot enter in considerable numbers without fatally diminishing population, the division of labour between the sexes cannot be defined further than by saying that, before civilization begins, the stronger sex forces the weaker to do all the drudgery; and that along with social advance the apportionment, somewhat mitigated in character, becomes variously specialized under varying conditions. As bearing on the causes of mitigation, it may here be noted that women are better treated where circumstances lead to likeness of occupations between the sexes. A probable further cause of improvement is the obtaining of wives by services rendered, instead of by property paid. Obviously, a wife long laboured for is likely to be more valued than one stolen or bought.

327. What connexion is there between the *status* of women and the type of social organization? A partial answer was reached when we concluded that there are

natural associations between militancy and polygyny and between industrialism and monogamy. For as polygyny implies a low position of women, while monogamy is a prerequisite to a high position; it follows that decrease of militancy and increase of industrialism, are general concomitants of a rise in their position. This conclusion appears to be congruous with the fact just observed. The truth that among peoples otherwise inferior, the position of women is relatively good where their occupations are nearly the same as those of men, seems allied to the wider truth that their position becomes good in proportion as warlike activities are replaced by industrial activities; since, when the men fight while the women work, the difference of occupation is greater than when both are engaged in productive labours, however unlike such labours may be in kind.

328. There is the fact, too, that the despotism distinguishing a community organized for war, is essentially connected with despotism in the household; while, conversely, the freedom which characterizes public life in an industrial community, naturally characterizes also the accompanying private life. In the one case compulsory co-operation prevails in both; and in the other case voluntary co-operation prevails in both.

329. It is of course difficult to generalize phenomena into the production of which enter factors so numerous and involved—character of race, religious beliefs, surviving customs and traditions, degrees of culture, etc.; and doubtless the many co-operating causes give rise to incongruities which qualify somewhat the conclusion drawn. But, in the main, it will be found to be substantially true.

XI. THE *STATUS* OF CHILDREN.

330. The *status* of a primitive man's child is like that of a bear's cub. There is neither moral obligation nor moral restraint; but there exists the unchecked power to foster,

to desert, to destroy, as love or anger moves. As the treatment of women by men cannot pass a certain degree of harshness without causing extinction of the tribe; so here, the tribe must disappear unless the love of progeny is strong.

331. The relations of adults to young among human beings began to assume higher forms under the influence of the following desires. First, to obtain a helper in fighting enemies; second, to provide an avenger for injuries received; and third, to leave behind one who should administer to welfare after death: motives which enforced the claims of male children, but not those of female. Showing once more the connexion between militancy of the men and degradation of the women.

332. What relation exists between the *status* of children and the form of social organization? With a highly militant type there goes extreme subjection of children, the *status* of girls being even lower than that of boys; while in proportion as the type becomes non-militant, there is not only more recognition of children's claims, but the recognized claims of boys and girls approach towards equality.

333. Kindred evidence to that obtained from the uncivilized and semi-civilized races is supplied by those societies which, passing through the patriarchal forms of domestic and political government, have evolved into large nations. Be the race Turanian, Semitic, or Aryan, it shows the same connexion between political absolutism over subjects and domestic absolutism over children.

334. If, again, the early states of existing European peoples, characterized by chronic militancy, are compared with their later states, characterized by a militancy less constant and diffused, and an increased industrialism, differences of like significance are met with.

335. As was to be anticipated, the series of changes in the *status* of children, is parallel to the series of changes in the *status* of women.

XII. DOMESTIC RETROSPECT AND PROSPECT.

336. That the chief conclusions are those which Evolution implies, will be evident to most readers ere this. Passing over the greater coherence, definiteness, and complexity, of the domestic and social arrangements of the more advanced societies, we find that there has been carried still further that conciliation of the interests of the species, of the parents, and of the offspring, which has been going on throughout evolution at large. Moreover, it has been shown that these higher traits in the relations of the sexes to one another and to children, which have accompanied social evolution, have been made possible by those higher traits of intelligence and feeling produced by the experiences and disciplines of progressing social states.

337. Advance from the lowest social groups, hardly to be called societies, to groups that are larger, or have more structure, or both, implies increased co-operation; which may be either compulsory or voluntary, or partly one and partly the other. We have seen that militancy implies predominance of compulsory co-operation, and that industrialism implies predominance of voluntary co-operation. Here we have to observe that it is deductively manifest, as it has been found to be inductively true, that the accompanying domestic relations are in each case congruous with the necessitated social relations.

338. What may be inferred respecting the future of the domestic relations? Assuming that in civilized nations industrialism will increase and militancy decrease, the question is—What are the domestic relations likely to coexist with complete industrialism?

339. Societies which from generation to generation produce in due abundance individuals who, relatively to the requirements, are the best physically, morally, and intellectually, must become the predominant societies; and must tend through the quiet process of industrial competition to replace other societies. Consequently, marital

relations which favour this result in the greatest degree, must spread; while the prevailing sentiments and ideas must become so moulded into harmony with them that other relations will be condemned as immoral. The monogamic form of the sexual relation is manifestly the ultimate form; and any changes to be anticipated must be in the direction of completion and extension of it.

340. If, still guiding ourselves by observing the course of past evolution, we ask what changes in the *status* of women may be anticipated, the answer must be that a further approach towards equality of position between the sexes will take place. With decline of militancy and rise of industrialism—with decrease of compulsory co-operation and increase of voluntary co-operation—with strengthening sense of personal rights and accompanying sympathetic regard for the personal rights of others; must go a diminution of the political and domestic disabilities of women, until there remain only such as differences of constitution entail. To draw inferences more specific is hazardous.

341. No very specific conclusions are to be drawn respecting future changes in the *status* of children. Whatever conduces to the highest welfare of offspring must more and more establish itself; since children of inferior parents reared in inferior ways, will ever be replaced by children of better parents reared in better ways.

342. One further possibility of domestic evolution remains. The last to show itself among the bonds which hold the family together—the care of parents by offspring —is the one which has most room for increase. With the strengthening of intellectual and moral sympathy, the latter days of life will be smoothed by a greater filial care, reciprocating the greater parental care bestowed in earlier life.

CHAPTER XXI.

CEREMONIAL INSTITUTIONS.

"The natural history of that third kind of government which, having a common root with the others, and slowly becoming separate from and supplementary to them, serves to regulate the minor actions of life."

I. CEREMONY IN GENERAL.

343. If, disregarding conduct that is entirely private, we consider only that species of conduct which involves direct relations with other persons; and if under the name government is included all control of such conduct, however arising; then it must be said that the earliest kind of government, the most general kind of government, and the government which is ever spontaneously recommencing, is the government of ceremonial observance. More may be said. This kind of government, besides preceding other kinds, and besides having in all places and times approached nearer to universality of influence, has ever had, and continues to have, the largest share in regulating men's lives.

344. The proposition that, the modified forms of action caused in men by the presence of their fellows, constitute that comparatively vague control out of which other more definite controls are evolved, and in which they ever continue immersed, looks strange mainly because, when studying less-advanced societies, we carry with us our developed conceptions of law and religion. Swayed by them, we fail to perceive that what we think the essential parts of sacred and secular regulations were originally subordinate parts, and that the essential parts consisted of

ceremonial observances. The primitiveness of Ceremonial regulation is shown by the facts that:—It begins with sub-human types of creatures; it occurs among otherwise ungoverned savages; it often becomes highly developed where the other kinds of rule are little developed; it is ever being spontaneously generated afresh between individuals in all societies; and it envelops the more definite restraints which State and Church exercise. Further, political and religious regulations are at first little more than systems of ceremony, directed towards particular persons living and dead: the code of law joined with the one, and the moral code joined with the other, coming later.

345. Applying the principle that divergent products of evolution betray their kinship by severally retaining certain traits which belonged to that from which they were evolved, it is inferable that if the controls classed as civil, religious, and social, have certain common characters, such characters, older than are these now differentiated controls, must have belonged to the primitive control out of which they were developed. Ceremonies, then, have the highest antiquity; for these differentiated controls all exhibit them.

346. It is commonly assumed that the modifications of behaviour which constitute ceremony are consciously chosen as symbolizing reverence or respect. Instead of arising, however, by dictation or by agreement, which would imply the pre-established organization required for making and enforcing rules, they arise by modifications of acts performed for personal ends; and so prove themselves to grow out of individual conduct before social arrangements exist to control it. Their apparently symbolic characters result from their survival under changed circumstances. Licking the hand is a common display of attachment on the part of a dog; and when we remember how keen must be the olfactory sense by which a dog traces his master, it cannot be doubted that to his gustatory sense, there is yielded some impression associated with those pleasures of affection which his master's presence gives.

Kissing being common to unlike and widely dispersed peoples, we may conclude that it originated in the same manner as the analogous action among lower creatures. What is the indirect result? From kissing as a natural sign of affection, there is derived the kissing which, as a means of simulating affection, gratifies those who are kissed; and by gratifying them, propitiates them. Hence an obvious root for the kissing of feet, hands, garments, as a part of ceremonial. An example will show that ceremonies also originate by natural sequence rather than by intentional symbolization. Arbitrary as the usage of bearing green boughs as a sign of peace seems when observed in its later forms only, it is by no means so when traced back to its origin. Travellers' narratives illustrate the fact that laying down weapons on approaching strangers is taken to imply pacific intentions. Opposite intentions being thus obviously negatived. But how is the absence of weapons to be shown when so far off that weapons, if carried, are invisible? Simply by carrying other things which are visible; and boughs covered with leaves are the most convenient and generally available things for this purpose. The green bough is thus primarily a sign that the advancing stranger is not an enemy. It is thereafter joined with other marks of friendship. It survives when propitiation passes into submission. And so it becomes incorporated with various actions which express reverence and worship.

347. That the government of observances has its organization, just as the political and ecclesiastical governments have, is a fact habitually passed over, because, while the last two organizations have developed, the first has dwindled: in those societies, at least, which have reached the stage at which social phenomena become subjects of speculation. Originally, however, the officials who direct the rites expressing political subordination have an importance second only to that of the officials who direct religious rites; and the two officialisms are homologous. To which-

ever class belonging, these functionaries conduct propitiatory acts: the visible ruler being the propitiated person in the one case, and the ruler no longer visible being the propitiated person in the other case. Both are performers and regulators of worship—worship of the living king and worship of the dead king. In our advanced stage the differentiation of the divine from the human has become so great that this proposition looks scarcely credible. But on going back through stages in which the attributes of the conceived deity are less and less unlike those of the visible man, and eventually reaching the early stage in which the other-self of the dead man, considered indiscriminately as ghost and god, is not to be distinguished, when he appears, from the living man; we cannot fail to see the alliance in nature between the functions of those who minister to the ruler who has gone away and those who minister to the ruler who has taken his place. What remaining strangeness there may seem in this assertion of homology disappears on remembering that in sundry ancient societies living kings were literally worshipped as dead kings were. Ceremonial organization dwindles only as fast as the structures, political and ecclesiastical, which exercise controls more definite and detailed, usurp its functions.

348. Bearing in mind these general conceptions, let us now deal with the several components of ceremonial rule.

II. TROPHIES.

349. In primitive states men are honoured according to their prowess—estimated here by the number of heads they can show, there by the number of jaw-bones, and elsewhere by the number of scalps. On reading that in some places a man's rank varies with the quantity of these proofs of his personal superiority, we see how they originate a regulative influence in social intercourse. Of what do the trophies consist?

350. Of parts cut from the bodies of the slain, heads are

among the commonest; probably as being the most unmistakable proofs of victory. This taking of heads as trophies obviously strengthens political power. It implies a character generating fear among enemies and obedience among subjects. The offering of heads in propitiation of the dead shows it to be a factor in sacrificial ceremonies. And that it affects social intercourse, is shown by the numerous instances in which the pride of individuals and families is proportioned to the number they possess.

351. The head of an enemy is of inconvenient bulk; and when the journey home is long there arises the question—Cannot proof that an enemy has been killed be given by carrying back a part only? The savage infers that it can, and acts on the inference. Jawbones, teeth, ears, and noses, are all alike easily detached, and serve as trophies among various races.

352. The entire skin may serve likewise as a trophy, but it is usually some smaller part. The requirement being simply that it shall be one of which the body yields no duplicate. Hence arises the practice of taking the skin covering the whole head, or that merely covering the crown —the custom of scalping. An enemy's hair alone is even in some cases sufficient.

353. Among easily transported parts carried home to prove victory, may next be named hands and feet. That either the right or the left hand or foot was the trophy, we may assume for, in the absence of any such distinction, victory over two enemies instead of one might be alleged. There may here be named another kind of trophy, the phallic.

354. Associated with the direct motive for taking trophies there is an indirect motive. The primitive belief that the spirit of each person is diffused throughout him, and that possession of a part of another's body gives possession of a part of his spirit, and, consequently, a power over his spirit, leads the primitive man to believe that the ghost of his enemy may be coerced by maltreating a preserved trophy of his enemy.

355. Hostility, and the injuries he suffers from it, excite in primitive man the same feeling whether the aggressor is without the tribe or within it: the enemy and the felon are undistinguished. Hence their similar treatment; the taking of trophies, and their display, from each.

356. One remaining general truth must be named. Trophy-taking is directly related to militancy. It develops with growing militancy, and diminishes with increasing industrialism. The chief significance of trophy-taking, however, has yet to be pointed out. The reason for here dealing with it, though in itself scarcely to be classed as a ceremony, is that it furnishes a key to numerous ceremonies prevailing all over the world among the uncivilized and semi-civilized. From the practice of cutting off and taking away portions of the dead body, there grows up the practice of cutting off portions of the living body.

III. MUTILATIONS.

357. The evidence that mutilation of the living has been a sequence of trophy-taking from the slain, is abundant and varied. Taking the trophy implies victory carried to the death; and the derived practice of cutting off a part from a prisoner implies subjugation of him. Eventually the voluntary surrender of such a part expresses submission; and becomes a propitiatory ceremony because it does this. Let us note the different kinds of mutilations, and the ways in which they severally enter into the three forms of control—political, religious, and social.

358. A conquered enemy may have one of his hands taken as a trophy, but this so greatly diminishes his value as a slave, that some other trophy is naturally preferred. Hence fingers and toes are, in various places, cut off and offered in propitiation of living rulers: the enemies thus mutilated being allowed to live as slaves. The propitiation of the dead by offering fingers, or parts of them, occurs in many places. This sacrifice to the ghost of the dead rela-

tive, or the dead chief, becomes in other cases, a sacrifice to the expanded ghost or god.

359. Noses are among the trophies taken from slain foes; and the loss of the nose is inflicted on captives, on slaves, and on transgressors of certain kinds. Ears are brought back from the battle-field; and occasionally they are cut off from prisoners, felons, or slaves; while there are peoples among whom pierced ears mark the servant or the subject.

360. Jaws and teeth, too, are trophies. And teeth, in some cases knocked out in propitiation of a dead chief, are, in various other cases, knocked out by a priest as a quasi-religious ceremony.

361. The rise of a class born in slavery, does away with the reason for a mark which involves serious mutilation. Consequently it is inferable that mutilations of the least injurious kinds will become the commonest. Such, at any rate, seems a reasonable explanation of the fact that cutting off of hair is the most prevalent mutilation. Hence the enslaved have their heads cropped; here scalp-locks are worn subject to a chief's ownership, and occasionally demanded in sign of submission; while, elsewhere, men sacrifice their beards to their rulers: unshorn hair thus becoming a mark of rank. Among numerous peoples, hair is sacrificed to propitiate the ghosts of relatives; whole tribes cut it off on the death of their chiefs or kings; and it is yielded up to express subjection to deities. Occasionally it is offered to a living superior in token of respect; and this complimentary offering is extended to others.

362. Similarly with genital mutilations: there is a like taking of certain parts from slain enemies and from living prisoners; and there is a presentation of them to kings and gods.

363. Self-bleeding, initiated partly, perhaps, by cannibalism, but more extensively by the mutual giving of blood in pledge of loyalty, enters into several ceremonies expressing subordination. It occurs in propitiation of ghosts

and of gods, and occasionally as a compliment to living persons.

364. Naturally it is the same with the resulting marks. Originally indefinite in form and place but rendered definite by custom, and at length often decorative, these healed wounds, at first entailed only on relatives of deceased persons, then on all the followers of a man much feared while alive, become marks expressive of subjection to a dead ruler, and eventually to a god: growing thus into tribal and national marks.

365. All the world over, scars resulting from wounds received in battle are held in honour and displayed with pride. And there is evidence to show that anxiety to get honour sometimes leads to the making of scars artificially. Markings on the skin become in some cases honourable distinctions, and occasionally signs of rank.

366. There is also a secondary motive for taking trophies. By the savage preserving a part cut from one whom he has enslaved, both he and the slave think that he so obtains a power to inflict injury.

367. Derived as mutilations are from trophy-taking, and developing with the development of the militant type, they must, by implication, decrease as fast as the societies consolidated by militancy become less militant, and must disappear as the industrial type of structure evolves. That they do so, European history at large may be assigned in proof. And it is significant that in our own society, now predominantly industrial, such slight mutilations as continue are connected with that regulative part of the organization which militancy has bequeathed: there survive only the tattooings of sailors, the branding of deserters (until recently), and the cropping of the heads of felons.

IV. PRESENTS.

368. Gifts, spontaneously made among primitive men to one whose goodwill is desired, become, as society evolves,

the originators of many things. Noting the alliance between mutilations and presents—between offering a part of the body and offering something as a substitute—let us observe the several varieties of gift-making as a ceremony, and the social arrangements derived from it.

369. At first the head man, not much differentiated from the rest, fails to impress them sufficiently to make present-giving an habitual ceremony. It is only in a compound society, resulting from the over-running of many tribes by a conquering tribe, that there comes a governing class sufficiently distinguished from the rest, and sufficiently powerful to inspire the required awe.

370. A more extended form simultaneously develops. For where along with subordinate rulers there exists a chief ruler, he has to be propitiated alike by the people at large and by the subordinate rulers.

371. From propitiatory presents, voluntary and exceptional to begin with, but becoming, as political power strengthens, less voluntary and more general, there eventually grow up universal and involuntary contributions—established tribute. As values become more definite, and payment in coin easier, this again passes into taxation.

372. The payment of fixed sums for specified services is now so habitual, that we assume this relation to have existed from the beginning. Originally, however, the subordinates of the chief man, not officially supported, have to support themselves. And as their positions enable them to injure or to benefit subject persons—as, indeed, it is often only by their aid that the chief man can be invoked; there arises the same motive to propitiate them by presents that there does to propitiate by presents the chief man himself. Whence the parallel growth of an income.

373. The supplies of food &c., placed on the grave of the dead man to please his ghost, developing into larger and repeated offerings at the grave of the distinguished dead man, and becoming at length sacrifices on the altar of the god, differentiate at the same time in an analogous

way. The present of meat, drink, or clothes, at first supposed to beget goodwill because actually useful, becomes, by implication, significant of allegiance. Hence, making the gift grows into an act of worship irrespective of the value of the thing given; while, as affording sustenance to the priest, the gift makes possible the agency by which the worship is conducted. From oblations originate Church revenues.

374. And now we come upon a remarkable sequence. As the present to the ruler eventually develops into political revenue, so the present to the god develops into ecclesiastical revenue. From the stages in which the present to the supernatural being is shared between him and those who worship him; and in which the present is shared in by medicine-men or priests only; the transition is gradual to that stage where the sacerdotal class are completely maintained by presents, as in Dahomey, where "those who have the 'cure of souls' receive no regular pay, but live well upon the benevolences of votaries." (*Mission to Gelele*, R. F. Burton, 1864, II. 151.) Hence, again, the control of ceremony precedes the political and ecclesiastical controls; since from the actions which the first initiates, eventually result the funds by which the others are maintained.

375. So far the presents made by superiors to inferiors have been ignored. As the power of the political head develops, until at length he assumes universal ownership, there results a state in which he finds it needful to give back part of that which he has monopolized. From these donations made by ruling persons there eventually develop salaries.

376. How gift-making, first developed into a ceremony by fear of the chief ruler, and made to take a wider range by fear of the powerful, is eventually rendered general by fear of equals who may prove enemies if they are passed over when others are propitiated, we may gather from European history. Thus, in Rome, clients gave presents to their patrons; and all the Romans gave them to Augustus.

Present-makings of these kinds have undergone changes like those which we have traced in other kinds of present-makings: beginning as voluntary, they have become in a measure compulsory.

377. The evidence shows that present-making, while but indirectly related to the social type as simple or compound, is directly related to it as more or less militant in organization. We may say that the ceremony of present-giving, taking shape with the establishment of that political headship which militancy produces, increases with the development of the militant type of social structure, and declines with the development of the industrial type.

V. VISITS.

378. In its primitive form, making a present implies going to see the person to whom it is made. Hence, by association, this act comes to be itself indicative of respect, and eventually acquires the character of a reverential ceremony.

379. Naturally the ceremony of visiting takes no definite shape where the power of the chief is undecided; and hence is not usual in simple tribes. In a compound society, however, headed by a chief who has been victorious over other chiefs, there arises the need for periodic demonstrations of allegiance. Habitually the central ruler, suspecting conspiracies among the subjugated local rulers, insists on their frequently recurring presence at his residence to re-assure him of their loyalty by gifts brought and homage performed, while he gets proof that his guests are not then engaged in trying to throw off his yoke. Hence in compound societies the periodic visit to the king becomes a political ceremony.

380. Remote as appear the going to church and the going to court, they are divergent forms of the same thing. That which once linked the two has now almost lapsed; but we need only go back to early times, when a journey

to the abode of a living superior had the purpose of carrying a present, doing homage, and expressing submission, while the journey to a temple was made for offering oblations, professing obedience, and uttering praises, to recognize the parallelism.

381. As with other ceremonies so with this ceremony. What begins as a propitiation of the most powerful man—now living, now dead, now apotheosized—extends as a propitiation of men who are less powerful; and, continuing to spread, finally becomes a propitiation of equals. The visit of ceremony gradually descends to an ordinary civility.

382. Finally, visit-making being one of the expressions of obedience, is associated with development of the militant organization. With predominant industrialism the visit as a manifestation of loyalty is no longer imperative.

VI. OBEISANCES.

383. While trying to propitiate a superior by expressing submission to him, there is also generally an endeavour further to propitiate him by showing joy at his presence. Keeping in view both these elements of the obeisance, let us now consider its varieties.

384. The primary form of obeisance is that of prostration on the back, implying absolute submission; a form which is afterwards abbreviated to prostration on the face, and to semi-prostration on the knees. Attitudes alike of the conquered before the conqueror, of the slave before his master, and of the worshipper before his deity; for obeisances are alike whether the being to be propitiated is visible or invisible.

385. From the posture of the Mahommedan worshipper, we pass to the posture on all fours; and from this, by raising the body, to kneeling on both knees; to descent on one knee; to bending the knee; and then to merely bending the body. Bearing in mind that there are insensible transitions between the humble salaam of the Hindoo, the

profound bow which in Europe shows great respect, and the moderate bend of the head expressive of consideration, we cannot doubt that the familiar and sometimes scarcely perceptible nod, is the last trace of the prostration.

386. Of the simulated signs of pleasure commonly forming part of the obeisance—such as clapping the hands, jumping, and dancing—kissing is the most conspicuous. This, of course, with the other forms, has to be consistent with the humility of the prostration or kindred attitude. Hence, kissing the feet, the knees, or the garments. Kissing the hand, as it does not involve a prostration, is a less humiliating, but nevertheless very prevalent, obeisance. That the common custom of kissing the hand to another, originally expressed the wish, or the willingness, to kiss his hand, is justified by evidence. As before, these actions of love and liking are used to the ghost, and to the deity developed from the ghost.

387. Men cannot prostrate themselves in the sand before their king without soiling themselves. Hence the adhering dirt is recognized as a concomitant mark of subjection; and leads to the practice of putting dust or ashes on some part of the body, and eventually to merely pretending to do so—as when Turks "go through the form of throwing dust over their heads;" (*Three Years in Constantinople*, C. White, 1846, II. 239.) This sign of submission was also made before invisible persons.

388. A sign of humility in ancient Peru was to have the hands bound and a rope round the neck: the condition of captives was simulated. The evidence forces on us the inference that raising the joined hands as part of that primitive obeisance signifying absolute submission, was an offering of the hands to be bound. The presentation of the hands joined palm to palm, once throughout Europe required from an inferior when professing obedience to a superior, is still taught to children as the attitude of prayer.

389. The conquered man, prostrate before his conqueror,

and becoming himself a possession, simultaneously loses possession of whatever things he has about him; and therefore, surrendering his weapons, he also yields up, if the victor demands it, whatever part of his dress is worth taking. Hence the nakedness, partial or complete, of the captive, becomes additional evidence of his subjugation. In this surrender of clothing originates those obeisances which are made by uncovering the body, more or less extensively. Removal of the hat is a remnant of that process by which, in early times, the captive expressed the yielding up of all he had. Submission was also expressed by taking off those parts of the dress and appendages which were inconsistent with the appearance of servitude; and even more prominently by the donning of coarse clothing—the clothing of slaves. Observances of this kind extend themselves from the feared being who is visible to the feared being who is invisible—the ghost and the god. These obeisances, made first to supreme persons and presently to less powerful persons, diffuse gradually until they become general.

390. If of two persons each wishes to make an obeisance to the other by kissing his hand, and each out of compliment refuses to have his own hand kissed—as amongst the Arabs of Yemen—what will happen? There will result a raising of the hand of each by the other towards his own lips, and by the other a drawing of it down again, and so on alternately: a probable origin of hand-shaking.

391. Whatever its kind, then, the obeisance has the same root with the trophy and the mutilation. That all obeisances originate in militancy, harmonizes with the fact that they develop along with development of the militant type of society. A connexion which is at once seen to be natural on remembering that militant activities, intrinsically coercive, necessitate command and obedience; and that therefore where they predominate, signs of submission are insisted upon. Conversely, industrial activities, whether exemplified in the relations of employer and employed or of buyer and seller, being carried on under agree-

ment, are intrinsically non-coercive; and therefore, where they predominate, only fulfilment of contract is insisted upon: whence results decreasing use of the signs of submission.

VII. FORMS OF ADDRESS.

392. What an obeisance implies by acts, a form of address says in words. If the two have a common root this is to be anticipated; and that they have a common root is demonstrable. Instances occur in which the one is recognized as equivalent to the other..

393. Those modes of addressing a real or fictitious superior, indirectly asserting subjection to him in body and effects, are secondary in importance to the direct assertions of slavery and servitude; which, beginning in barbarous days, have persisted down to the present time.

394. Hebrew narratives have familiarized us with the word "servant," implying "slave," as applied to himself by a subject or inferior, when speaking to a ruler or superior. In our days professions of servitude have left only such written representatives as:—"Your obedient servant," "Your humble servant;" reserved for occasions when distance is to be maintained, and for this reason often having inverted meanings. That for religious purposes the same propitiatory words are employed, is a familiar truth.

395. From those phrases which express abasement of self, we pass to those which exalt another. Either kind taken alone, is a confession of relative inferiority; and this confession gains in emphasis when the two kinds are joined, as they commonly are. At first it does not seem likely that eulogies may, like other propitiations, be traced back to the behaviour of the conquered to the conqueror, yet there is proof that they do thus originate.

396. Into the complete obeisance we saw that there enter two elements, one implying submission and the other implying love; and into the complete form of address two

analogous elements enter. With words employed to propitiate by abasing self or elevating the person addressed, or both, are joined words suggestive of attachment to him—wishes for his life, health, and happiness. These latter, indeed, being of earlier origin than professions of subjection.

397. There remain to be noted those modifications of language, grammatical and other, which, by implication, exalt the person addressed or abase the person addressing. Akin to the idea that it is an unpardonable liberty to gaze at the supreme person, the linguistic forms used in compliment have the trait that they avoid direct relations with the individual addressed. Among rude peoples proper names, acquiring a kind of sacredness, are avoided. And not only this, but there is an avoidance of personal pronouns, which are thought to establish a relation too immediate to be allowed where distance is to be maintained.

398. Forms of address, being akin to obeisances, have of course the same general relation to social types. On contrasting the Europe of past times, characterized by social structures developed by, and fitted for, perpetual fighting, with modern Europe, in which, though fighting on a large scale occurs, it is the temporary rather than the permanent form of social activity, it is to be observed that complimentary expressions, now less used, are also now less exaggerated.

VIII. TITLES.

399. Everyone now knows that languages are not devised but evolve; and the same is true of titles. They have differentiated from ordinary proper names, by being descriptive of some trait, or some deed, or some function, held in honour.

400. Various savage races, on the occasion of a great achievement in battle, give a man a name of renown in addition to, or in place of, the name by which he was

previously known. Sundry titles of the gods have originated in a kindred manner.

401. Very generally among primitive men, instead of the literally-descriptive name of honour, there is given the metaphorically-descriptive name of honour. A king being addressed, for instance, as "You mountain, you lion, you tiger." In the metaphorically-descriptive name, there is the germ of primitive titles of honour; which, at first individual titles, become in some cases titles attaching to the offices filled.

402. To say that the words which in various languages answer to our word "God," were originally descriptive words, will be repugnant to those who persist in asserting that the conception of an universal creative power was possessed by man from the beginning. But whoever studies the evidence without bias, will find proof that the general word for deity was at first simply a word expressive of superiority. It even enters into ordinary intercourse as a greeting between the living.

403. The connexion between "God" as a title and "Father" as a title, becomes clear on going back to those early forms of conception and language in which the two are undifferentiated. The fact that even in so advanced a language as Sanscrit, words which mean "making," "fabricating," "begetting," or "generating," are indiscriminately used for the same purpose, suggests how naturally in the primitive mind, a father, as begetter or causer of new beings, ceasing at death to be visible, is then associated in word and thought with dead and invisible causers at large, who, some of them acquiring pre-eminence, come to be regarded as causers in general—makers or creators. Among all nations "Father" and "God" are found to be alternative titles. By diffusion the title Father comes to be applied to a living potentate; and indeed, it is the name everywhere for any kind of superior.

404. The supremacy associated with age gives rise to a kindred but divergent group of titles. Councils being

formed of the older men, the local name for an older man becomes associated in thought with an office of power and therefore of honour.

405. The need for marking by some additional name the ruler who becomes head over many rulers, leads to the introduction of other titles of honour. As, for instance, in the frequently used "king of kings," a title common alike to the visible and the invisible ruler. It is needless to add that special titles, like general titles, are not made but grow—are at first descriptive.

406. Perhaps better in the case of titles than in any other case, is illustrated the diffusion of ceremonial forms that are first used to propitiate the most powerful only. Uncivilized and semi-civilized peoples of past times, and existing civilized peoples, all furnish examples. How high titles eventually descend to the very lowest people, is shown most startlingly in Spain; where "even beggars address each other as Señor y Caballero—Lord and Knight." (*Handbook for Travellers in Spain.* R. Ford. 1847. § xvii, 52.)

407. As before, titles, serving first to commemorate the triumphs of savages over their foes, have expanded, multiplied, and differentiated, as conquests have formed large societies by consolidation and re-consolidation of small ones. And, belonging to the social type generated by habitual war, they tend to lose their uses and their values, in proportion as this type is replaced by one fitted for carrying on the pursuits of peace.

IX. BADGES AND COSTUMES.

408. The pursuit of interpretations once more takes us back to victories achieved over men or animals. Badges are derived from trophies; with which, in early stages, they are identical.

409. Besides sometimes losing parts of their bodies, which thereupon become trophies, conquered men invariably

lose their weapons, and these naturally also become trophies; as they did among the Greeks, and as they did again in the time of Charlemagne, to whom swords of subdued chiefs were brought. And if, as we see, parts of vanquished foes' bodies, brute or human, when worn become badges; we may expect that the weapons of the vanquished when carried by the victors, will also become badges.

410. The flag or ensign is a modified and developed spear or lance; whose appendages, first used for display, came incidentally to furnish a means of identification, whereby the whereabouts of the leader could be traced. By development of its decorative part the banner resulted.

411. And here we come upon the now-familiar inference that heraldic badges have descended from these primitive tribal badges, or totems. Whether on coach-panels, plate, or seals, the family-marks of to-day have thus originated.

412. Civilized usages obscure the truth that men were not originally prompted to clothe themselves by either the desire for warmth, or the thought of decency. The dress, like the badge, is at first worn from the wish for admiration. Some of the facts concerning American Indians, who wear as marks of honour the skins of formidable animals they have killed, suggest that the badge and the dress have a common root, and that the dress is, at any rate in some cases, a collateral development of the badge. Again, since by taking his clothes, nakedness is commonly made a trait of the prisoner, and consequently of the slave, relative amount of clothing becomes a class distinction. It is needless to point out how rank came to be marked by the quantities, qualities, shapes, and colours, of dresses.

413. The causes which have originated, developed, and specialized badges and dresses, have done the like with ornaments; which have, indeed, the same origins. They begin as actual trophies, pass into representations of trophies made of precious materials, and, subsequently losing their resemblance to trophies, come to be marks of honour given to brave warriors by their militant rulers; hence, stars,

crosses, medals, and the like. The rudimentary æsthetic sense which leads the savage to paint his body, has doubtless a share in prompting the use of attractive objects for ornaments; as also the desire to carry mementoes of deceased relatives. Signs of subjection, losing their meaning, also survive as ornaments, as the nasal ring.

414. The wish to propitiate cannot be said to have caused the spread of badges, costumes, and decorations. It this case it is rather that the lower grades have sought to raise themselves into the grades above, by assuming their distinctive marks; and that, where feared, they have been propitiated by allowing them to do this.

415. Though there are not numerous parallelisms between the celestial rule and the terrestrial rule, in respect of these elements of ceremony, it may be well to name one—the sceptre. The facts that those who form the regulative organization, which is originated by militancy, are distinguished from those who form the organization regulated, which is of industrial origin, by the prevalence among them of visible signs of rank; and that the militant part of this regulative organization is more than the rest characterized by the conspicuousness, multiplicity, and definiteness, of those costumes and badges which distinguish both its numerous divisions and the numerous ranks in each division; are facts unmistakably supporting the inference that militancy has generated all these marks of superiority and inferiority.

X. FURTHER CLASS-DISTINCTIONS.

416. Foregoing divisions have shewn how ceremonial usages, in course of time, lose the more obvious traces of their origin. Bearing in mind the importance attaching to relative height, and also the importance attaching to relative wealth, we shall readily trace the genesis of sundry curious observances.

417. When we find that among some uncivilized people

the abundance and fine quality of the fat used for protecting the skin from insects marks wealth, and consequently rank; and that the anointing with unguents among the Egyptians was an act of propitiation, alike to gods, kings, deceased persons, and ordinary guests; we may reasonably infer that this ceremony attending investiture with sovereignty was originally one indicating the wealth that implied power.

418. An ornamental and elevated abode implies at once display of riches and assumption of a position overlooking others. Hence, in various places, the ornament and the heights to which different ranks may build is limited.

419. Again, various appliances to comfort which the man of rank and influence has may be denied to the poorer class. The palanquin or equivalent vehicle is in many places forbidden to inferior persons; as also the possession of attendants to carry umbrellas or other protections against the sun. In Fiji the best kind of mat for lying on is forbidden to the common people. And among the Joloffs the use of the mosquito curtain is a royal prerogative.

420. Of sumptuary laws, those regulating the uses of foods may be traced back to very early stages—when usages had not yet taken the shape of laws. They go along with the subordination of the young to the old, and of females to males.

421. Of the various class-distinctions which imply superior rank by implying greater wealth, the most curious remain. As indicating freedom from labour, we have the pride of delicate hands among ourselves; the cramped feet of the Chinese ladies; and the undue fatness which is a source of pride in a Chinese mandarin. Throughout Africa there prevails an admiration for corpulence in women, and fattening "must be duly enforced by the rod if necessary." (*Journal of the Discovery of the Source of the Nile.* J. H. Speke. 1863. 231.)

422. That these further class-distinctions are indirectly traceable to militancy, and that they fade as industrialism develops, needs only to be stated.

XI. FASHION.

423. Fashion is intrinsically imitative. Imitation may be prompted by reverence for one imitated, or by the desire to assert equality with him. Hence, there are two clues to the origin of fashion.

424. From a deep neckcloth being worn by a king to hide a defective neck, from its adoption by courtiers, and from its spreading downwards; we see how—from the desire to propitiate by assuming the defects of a superior—a fashion in dress may result; and how from approval of imitations of this kind may insensibly come tolerance of other imitations.

425. Not that such a cause would produce such an effect by itself. There is a co-operating cause which takes advantage of the openings thus made. Competitive imitation, ever going as far as authority allows, turns to its own advantage every opportunity which reverential imitation makes.

426. Entangled and confused with one another as Ceremonial and Fashion are, they have thus different origins and meanings: the first being proper to the *régime* of compulsory co-operation, and the last being proper to the *régime* of voluntary co-operation. Clearly there is an essential distinction, and, indeed, an opposition in nature, between behaviour required by subordination to the great, and behaviour resulting from imitation of the great.

XII. CEREMONIAL RETROSPECT AND PROSPECT.

427. The rules of behaviour, then, are natural products of social life which have gradually evolved. Their advance in integration, heterogeneity, definiteness, and coherence, proves their conformity to the laws of Evolution at large.

428. When we are shown the common origin of observances that are now distinguished as political, religious, and social; when we thus find verified in detail the hypothesis

that ceremonial government precedes in time the other forms of government, into all of which it enters; we are shown how, in conformity with the general laws of Evolution, it differentiates into three great orders at the same time that each of these orders differentiates within itself.

429. From the beaten dog which, crawling, licks its master's hand, the general truth may be traced that ceremonial forms are naturally initiated by the relation of conqueror and conquered, and the consequent truth that they develop along with the militant type of society. That these connexions are necessary, is evident on remembering how, with the compoundings and re-compoundings of social groups effected by militancy, there must go an evolution of the forms of subordination; made strong by the needs for restraint, made multitudinous by the gradations of rank, and made precise by continual performance under penalty.

430. That the moral character natural to the militant type of society, fosters ceremony; while the moral character natural to the industrial type is unfavourable to it, will be evident from the considerations that ceremony originates from fear—on the one side supremacy of a victor; on the other side dread of death or punishment felt by the vanquished; that independence increases as social co-operation becomes less coercive; and that, as fast as the wish to be exalted at the cost of humiliation to others, is checked by sympathy, the appetite for marks of honour prefers the more subdued indications of respect.

431. It must also be noted that the restraints of ceremony not only form a part of the coercive *régime*, proper to those lower social types characterized by predominant militancy, but also that they form part of a discipline by which men are adapted to a higher social life.

432. This brings us to the general truth that within each embodied set of restraining agencies—the ceremonial as well as the political and ecclesiastical which grow out of it—there gradually evolves a special kind of disembodied control, that of politeness, which eventually becomes in-

dependent. As law differentiates from personal commands, and morality from religious injunctions, so politeness differentiates from ceremonial observance, and rational usage from fashion.

433. Is it needful to say that with further development of the social type based on voluntary co-operation, with higher emotions and higher intelligences, will come a still greater disuse of obeisances, of complimentary forms of address, of titles, of badges, &c., &c.?

CHAPTER XXII.

POLITICAL INSTITUTIONS.

"The evolution of governments, general and local, as determined by natural causes; their several types and metamorphoses; their increasing complexity and specialization; and the progressive limitation of their functions."

I. PRELIMINARY.

434. In pursuing sociological inquiries, and especially those on which we are now entering, we must, as much as possible, exclude whatever emotions the facts are calculated to excite, and attend solely to the interpretation of the facts.[1]

435. We must be prepared to recognize the usefulness of the superstitions of primitive man. We must not let our feelings blind us to the proofs that inter-social conflicts have furthered the development of social structures. Moreover, dislikes to governments of certain kinds must not prevent us from seeing their fitnesses to their circumstances. So, too, with the associated ownership of man by man. In brief, trustworthy interpretations of social arrangements imply an almost passionless existence.

436. Maintenance of this mental attitude will be furthered by keeping before ourselves the truth that in human actions the absolutely bad may be the relatively good, and the absolutely good may be the relatively bad.

437. Another of our ordinary conceptions has to be much

[1] The subject-matter of this division is treated in far greater detail in Mr. Spencer's ancillary work—*The Study of Sociology*.

widened before political evolution can be rightly interpreted. The words "civilized" and "savage" must have meanings given to them differing greatly from those which are current. That broad contrast usually drawn wholly to the advantage of the men who form large nations, and to the disadvantage of the men who form simple groups, a better knowledge obliges us profoundly to qualify. Characters are to be found among rude peoples which compare well with those of the best among cultivated peoples. With little knowledge and but rudimentary arts, there in some cases go virtues which might shame those among ourselves whose education and polish are of the highest. Whatever relation exists between moral nature and social type, is not such as to imply that the social man is in all respects emotionally superior to the pre-social man.

438. "How is this conclusion to be reconciled with the conception of progress?" most readers will ask. While conceding that without perpetual strifes, civilized societies could not have arisen, and that an adapted form of human nature, fierce as well as intelligent, was a needful concomitant; we may at the same time hold that such societies having been produced, the brutality of nature in their units which was necessitated by the process, ceasing to be necessary with the cessation of the process, will disappear. While the benefits achieved remain a permanent inheritance, the evils entailed will decrease and slowly die out.

439. The complexity and confusion of the evidence bearing upon political institutions, is such that only certain general conclusions can be positively established. Happily, however, these are the conclusions of most value for guidance.

II. POLITICAL ORGANIZATION IN GENERAL.

440. A society, in the sociological sense, is formed only when, besides juxtaposition, there is co-operation. Co-operation is made possible by society, and makes society

possible. It pre-supposes associated men; and men remain associated because of the benefits co-operation yields them. But there cannot be concerted actions without agencies by which actions are adjusted in their times, amounts, and kinds; and the actions cannot be of various kinds without the co-operators undertaking different duties. That is to say, the co-operators must become organized, either voluntarily or involuntarily.

441. The organization which co-operation implies, is of two kinds, distinct in origin and nature. The one, arising directly from the pursuit of individual ends, and indirectly conducing to social welfare, develops unconsciously and is non-coercive. The other, arising directly from the pursuit of social ends, and indirectly conducing to individual welfare, develops consciously and is coercive. For the present we must, so far as may be, limit our attention to the last.

442. While political organization, as it extends itself throughout masses of increasing size, directly furthers welfare by removing that impediment to co-operation which the antagonisms of individuals and of tribes cause, it indirectly furthers it in another way. Nothing beyond a rudimentary division of labour can arise in a small social group. Nor is this all. Neither the required complex combinations of individuals, nor the elaborate mechanical appliances which facilitate manufacture, can arise in the absence of a large community, generating a great demand.

443. But political organization also necessitates disadvantages; and it is quite possible for these to outweigh the advantages. Maintenance of the controlling structures is costly; and the cost may become a greater evil than the evils escaped. It necessarily imposes restraints; and these restraints may become so extreme that anarchy, with all its miseries, is preferable. Political control also indirectly entails evils on those who exercise it as well as on those over whom it is exercised.

444. An established organization is an obstacle to re-

organization. Self-sustentation is the primary aim of each part as of the whole; and hence parts once formed tend to continue, whether they are or are not useful. Moreover, each addition to the regulative structures, implying, other things being equal, a simultaneous deduction from the rest of the society which is regulated, it results that while obstacles to change are increased, the forces causing change are decreased.

445. Maintenance of a society's organization implies that the units forming its component structures shall severally be replaced as they die. Stability is favoured if the vacancies they leave are filled without dispute by descendants; while change is favoured if the vacancies are filled by those who are experimentally proved to be the best fitted for them. Succession by inheritance is thus the principle of social rigidity—favours the maintenance of that which exists; while succession by efficiency is the principle of social plasticity, favours transformation, and makes possible something better.

446. Though, to make co-operation possible, and therefore to facilitate social growth, there must be organization, yet the organization formed impedes further growth; since further growth implies re-organization, which the existing organization resists; and since the existing organization absorbs part of the material for growth.

447. Bearing in mind the foregoing general facts, we may see that while, at each stage, better immediate results may be achieved by completing organization, they must be at the expense of better ultimate results.

III. POLITICAL INTEGRATION.

448. The political evolution manifested by increase of mass, is here distinguished as political integration. It has the following traits. While the aggregates are small, the incorporation of materials for growth is carried on at one another's expense in feeble ways—by taking one another's game, by

robbing one another of women, and, occasionally by adopting one another's men. As larger aggregates are formed, incorporations proceed in more wholesale ways; first by enslaving the separate members of conquered tribes, and presently by the bodily annexation of such tribes, with their territory. With further compounding there arise increasing desires to absorb adjacent smaller societies, and so to form still larger aggregates.

449. Conditions of several kinds further or hinder social growth and consolidation. The habitat may be fitted or unfitted for supporting a large population; or it may, by great or small facilities for intercourse within its area, impede co-operation; or it may, by presence or absence of natural barriers, make easy or difficult the keeping together of the individuals under that coercion which is at first needful. And, as the antecedents of the race determine, the individuals may have in greater or less degrees the physical, the emotional, and the intellectual natures fitting them for combined action.

450. While the extent to which social integration can in each case be carried, depends in part on these conditions, it also depends in part upon the degree of likeness among the units. At first, while the nature is so little moulded to social life that cohesion is small, aggregation is largely dependent on ties of blood: implying great degrees of likeness. Groups in which such ties, and the resulting congruity, are most marked, and which, having family traditions in common, a common male ancestor, and a joint worship of him, are in these further ways made alike in ideas and sentiments, are groups in which the greatest social cohesion and power of co-operation arise. For a long time the clans and tribes descending from such primitive patriarchal groups, have their political concert facilitated by this bond of relationship and the likeness it involves. Only after adaptation to social life has made considerable progress, does harmonious co-operation among those who are not of the same stock become practicable; and even

then their unlikenesses of nature must be small. Where their unlikenesses of nature are great, the society, held together only by force, tends to disintegrate when the force fails.

451. One of the laws of evolution at large, is that integration results when like units are subject to the same force or to like forces (*First Principles*, § 169); and from the first stages of political integration up to the last, this law is illustrated. Likeness in the units forming a social group being one condition to their integration, a further condition is their joint reaction against external action: co-operation in war is the chief cause of social integration. The temporary unions of savages for offence and defence, show the initiatory step. When many tribes unite against a common enemy, long continuance of their combined action makes them coherent under some common control. And so it is subsequently with still larger aggregates.

452. Progress in social integration is both a cause and a consequence of a decreasing separableness among the units. Primitive wandering hordes exercise no such restraints over their members as prevent them individually from leaving one horde and joining another at will. Where tribes are more developed, desertion from one and admission into another are less easy—the assemblages are not so loose in composition. And throughout those long stages during which societies are being enlarged and consolidated by militancy, the mobility of the units becomes more and more restricted. Only with that substitution of voluntary co-operation for compulsory co-operation which characterizes developing industrialism, do the restrictions on movement disappear: enforced union being in such societies adequately replaced by spontaneous union.

453. A remaining truth to be named is that political integration, as it advances, obliterates the original divisions among the united parts. In the first place, there is a slow disappearance of those non-topographical divisions arising from relationship. In the second place, the smaller local

societies united into a larger one, lose their separate organizations by long co-operation. And in the third place, there simultaneously results a fading of their topographical bounds, and a replacing of these by the new administrative bounds of the common organization. Hence naturally results the converse truth, that in the course of social dissolution the great groups separate first; and afterwards, if dissolution continues, these separate into their component smaller groups.

IV. POLITICAL DIFFERENTIATION.

454. As was pointed out in *First Principles*, § 154, the state of homogeneity in the social aggregate is an unstable state. Political divisions arise wherever there is some coherence and some permanence of relation among the parts of the aggregate.

455. The primary political differentiation originates from the primary family differentiation. Men and women being exposed, by the unlikenesses of their functions in life, to unlike influences, begin from the first to assume unlike positions in the community, as they do in the family: very early they respectively form the two political classes of rulers and ruled.

456. Composed of units who are detached from their original social relations and from one another, and absolutely attached to their owners, the slave-class is, at first, but indistinctly separated as a social stratum. It acquires separateness only as fast as there arise some restrictions on the powers of the owners. Ceasing to stand in the position of domestic cattle, slaves begin to form a division of the body politic when their personal claims begin to be distinguished as limiting the claims of their masters.

457. Where men have passed into the agricultural or settled state, it becomes possible for one community to take possession bodily of another community, along with the territory it occupies. When this happens there arise addi-

tional class-divisions. The conquered and tribute-paying community, besides having its headmen reduced to subjection, has its people reduced to a state such that, while they continue to live on their lands, they yield up, through the intermediation of their chiefs, part of the produce to the conquerors: so foreshadowing what eventually becomes a serf-class.

458. From the beginning the militant class, being by force of arms the dominant class, becomes the class which owns the source of food—the land. During the hunting and pastoral stages, the warriors of the group hold the land collectively. On passing into the settled state, their tenures become partly collective and partly individual in sundry ways, and eventually almost wholly individual. But throughout long stages of social evolution, landowning and militancy continue to be associated.

459. The class-differentiation of which militancy is the active cause, is furthered by the establishment of definite descent, especially male descent, and by the transmission of position and property to the eldest son of the eldest continually. This conduces to inequalities of position and wealth between near kindred and remote kindred; and such inequalities once initiated, tend to increase; since it results from them, that the superior get greater means of maintaining their power by the immigration of fugitives, and by the accumulation of appliances for offence and defence.

460. Inequalities of social position, bringing inequalities in the supplies and kinds of food, clothing, and shelter, tend to establish physical differences; to the further advantage of the rulers and disadvantage of the ruled. And beyond the physical differences, there are produced by the respective habits of life, mental differences, emotional and intellectual, strengthening the general contrast of nature.

461. When there come the conquests which produce compound societies, and, again, doubly compound ones, there result superpositions of ranks. And the general

effect is that, while the ranks of the conquering society become respectively higher than those which existed before, the ranks of the conquered society become respectively lower.

462. The political differentiations which militancy originates, and which for a long time increase in definiteness, are at later stages, and under other conditions, interfered with, traversed, and partially or wholly destroyed. While the higher political evolution of large social aggregates, tends to break down the divisions of rank which grew up in the small component social aggregates, by substituting other divisions, these original divisions are still more broken down by growing industrialism. Generating a wealth that is not connected with rank, this initiates a competing power; and at the same time, by establishing the equal positions of citizens before the law in respect of trading transactions, it weakens those divisions which at the outset expressed inequalities of position before the law.

463. As verifying these interpretations, we may add that they harmonize with those already given of ceremonial institutions. When the conquered enemy is made a slave, and mutilated by taking a trophy from his body, there simultaneously originates the deepest political distinction and the ceremony which marks it. With the continued militancy that compounds and re-compounds social groups, there goes at once the development of political distinctions and the development of ceremonies marking them. And as we before saw that growing industrialism diminishes the rigour of ceremonial rule, so here it tends to destroy those class divisions which militancy originates.

V. POLITICAL FORMS AND FORCES.

464. Setting out with an unorganized horde, including both sexes and all ages, what must happen when some public question, as that of migration, or of defence against enemies, has to be decided? The assembled individuals will fall, more or less clearly, into two divisions. The

elder, the stronger, and those whose sagacity and courage have been proved by experience, will form the smaller part, who carry on the discussion; while the larger part, formed of the young, the weak, and the undistinguished, will be listeners, who usually do no more than express from time to time assent or dissent. A further inference may safely be drawn. In the cluster of leading men there is sure to be one whose weight is greater than that of any other—some aged hunter, some distinguished warrior, some cunning medicine-man, who will have more than his individual share in forming the resolution finally acted upon. That is to say, the entire assemblage will resolve itself, as in every public meeting of the present day, into three parts. To use a biological metaphor, there will, out of the general mass, be differentiated a nucleus and a nucleolus.

465. Of course the ratios among the powers of these three components are in no two cases quite the same. They everywhere undergo more or less change—change determined here by the emotional natures of the men composing the group; there by the physical circumstances as favouring or hindering independence; now by the activities as warlike or peaceful; and now by the exceptional characters of particular individuals.

466. Is there any fundamental unity of political forces accompanying this fundamental unity of political forms? We too frequently forget that governments are not themselves powerful, but are the instrumentalities of a power, which existed before governments arose; to which governments themselves owe their origin; and which ever continues to be that which, disguised more or less completely, works through them. In its primitive form, political power is the feeling of the community, acting through an agency which it has either informally or formally established. Doubtless, the power of the chief is in part personal; but his individual will is but a small factor; and the authority he wields is proportionate to the degree in which he expresses the wills of the rest.

467. While this public feeling, which first acts by itself and then partly through an agent, is to some extent the feeling spontaneously formed by those concerned, it is to a much larger extent the accumulated and organized sentiment of the past. The primitive control arises partly from the public opinion of the living, but more largely from the public opinion of the dead.

468. Let the truth be definitely noted, that the ruler, in part the organ of the wills of those around, is in a still greater degree the organ of the wills of those who have passed away; and his own will, much restrained by the first, is still more restrained by the last. Everywhere we are shown that his function as regulator is mainly that of enforcing the inherited rules of conduct which embody ancestral sentiments and ideas.

469. The foregoing must not lead us to anticipate the same traits in a rule coercively established by an invader, as in a rule that has grown up from within. Societies formed by conquest may be, and frequently are, composed of two societies, which are in large measure, if not entirely, alien; and in them there cannot arise a political force from the aggregate will. The cardinal truth, difficult adequately to appreciate, is that while the forms and laws of each society are the consolidated products of the emotions and ideas of those who lived throughout the past, they are made operative by the subordination of existing emotions and ideas to them.

470. On observing that men disregard the just claims of creditors, who for goods given cannot get the money, while they are anxious to discharge so-called debts of honour to those who have rendered neither goods nor services, we are obliged to admit that the total activities of men are still, as they were at the outset of social life, guided by the aggregate feeling, past and present; and that the political agency, itself a gradually-developed product of such feeling, continues still to be in the main the vehicle for a specialized portion of it, regulating actions of certain kinds.

VI. POLITICAL HEADS—CHIEFS, KINGS, ETC.

471. Let us now restrict ourselves to the development of the first component of the tri-une political structure. In the rudest groups there is not only an absence of political control, but there is resistance to the assumption of supremacy by any individual. A primitive insubordination which is greatly influenced by the environment and the habits of life as hindering or favouring coercion.

472. At the outset, the principle of efficiency is the sole principle of organization. Such political headship as exists, is acquired by one whose fitness asserts itself in the form of greater age, superior prowess, stronger will, wider knowledge, quicker insight, or larger wealth. But evidently supremacy which thus depends exclusively on personal attributes is but transitory. It is liable to be superseded by the supremacy of some more able man from time to time arising; and if not superseded, is ended by death. Before inquiring how permanent chieftainship becomes established, let us consider the two kinds of superiority which especially conduce to chieftainship, and their modes of operation.

473. Headship of the society, beginning with the influence gained by the warrior of greatest power, boldness, and capacity, becomes established where activity in war gives opportunity for his superiority to show itself and to generate subordination; and thereafter the growth of civil governorship continues related to the exercise of militant functions.

474. Another important factor in the genesis of political headship originates with the ghost-theory, and the concomitant rise of a belief that some men, having acquired power over ghosts, can obtain their aid. Generally the chief and the medicine-man are separate persons; and there then exists between them some conflict: they have competing authorities. But where the ruler joins with his power naturally gained, this ascribed supernatural power, his authority is necessarily much increased.

475. No settled arrangement can however arise in a primitive community so long as the function of each unit is determined exclusively by his fitness; since, at his death, the arrangement, in so far as he was a part of it, must be recommenced. Only when his place is forthwith filled by one whose claim is admitted, does there begin a differentiation which survives through successive generations.

476. The two primary forms of hereditary succession, and their effects, must here be noted. The custom of reckoning descent through females—which results in descent of property and power to brothers or to the children of sisters—which characterizes many rude societies, and survives in others that have made considerable advances, is less favourable to the establishment of permanent political headship than is the system of kinship through males—in which descent of property and power is to sons or daughters—conducing to a more coherent family, to a greater culture of subordination, and to a more probable union of inherited position with inherited capacity, which is general among advanced societies. In sundry semi-civilized societies distinguished by permanent political headships, inheritance through males has been established in the ruling house while inheritance through females survives in the society at large.

477. Descent through males also fosters ancestor-worship, and the consequent reinforcing of natural authority by supernatural authority—a very powerful factor. Development of the ghost-theory, leading as it does to special fear of the ghosts of powerful men, until, where many tribes have been welded together by a conqueror, his ghost acquires in tradition the pre-eminence of a god, produces two effects. In the first place his descendant, ruling after him, is supposed to partake of his divine nature; and in the second place, by propitiatory sacrifices to him, is supposed to obtain his aid. Rebellion hence comes to be regarded as alike wicked and hopeless.

478. The processes by which political headships are

established, repeat themselves at successively higher stages. In simple groups chieftainship is at first temporary—ceases with the war which initiated it. When simple groups that have acquired permanent political heads, unite for military purposes, the general chieftainship is originally but temporary. As in simple groups chieftainship is at the outset habitually elective, and becomes hereditary at a later stage; so chieftainship of the compound group is habitually elective at the outset, and only later passes into the hereditary. Similarly in some cases where a doubly-compound society is formed. Further, this later-established power of a supreme ruler, at first given by election and presently gained by descent, is commonly less than that of the local rulers in their own localities; and when it becomes greater, it is usually by the help of ascribed divine origin or ascribed divine commission.

479. Ascribed divine nature, or divine descent, or divine commission, naturally gives to the political head unlimited sway. In theory, and often to a large extent in practice, he is owner of his subjects and of the territory they occupy.

480. Where, in virtue of supposed supernatural genesis or authority, the king has become absolute, and, owning both subjects and territory, exercises all powers, he is obliged by the multiplicity of his affairs to depute his powers. There follows a reactive restraint due to the political machinery he creates; and this machinery ever tends to become too strong for him. Especially where rigorous adhesion to the rule of inheritance brings incapables to the throne, or where ascribed divine nature causes inaccessibility save through agents, or where both causes conspire, power passes into the hands of deputies. The legitimate ruler becomes an automaton and his chief agent the real ruler; and this agent, again, in some cases passing through parallel stages, himself becomes an automaton and his subordinates the rulers.

481. From the Evolution-standpoint we are enabled to discern the relative beneficence of institutions which, con-

sidered absolutely, are not beneficent: and are taught to approve as temporary that which, as permanent, we abhor. The evidence shows that subjection to despots has been largely instrumental in advancing civilization.

482. Thus, headship of the conquering chief has been a normal accompaniment of that political integration without which any high degree of social evolution would probably have been impossible. Only by imperative need for combination in war were primitive men led into co-operation. Only by subjection to imperative command was such co-operation made efficient. And only by the co-operation thus initiated were made possible those other forms of co-operation characterizing civilized life.

VII. COMPOUND POLITICAL HEADS.

483. We pass now to the development of the second element in the tri-une political structure—the group of leading men among whom the chief is, at first, merely the most conspicuous. We saw in *Sociology*, §§ 17, 449, that it is relatively easy to form a large society if the country is one within which all parts are readily accessible, while exit is difficult; and that, conversely, formation of a large society is prevented, or greatly delayed, by difficulties of communication within the occupied area, and by facilities of escape from it. So it is with the development of a more integrated form of government. The circumstances which impede social consolidation also impede the concentration of political power. The truth here chiefly of importance is, however, that the continued presence of the one or the other set of conditions, fosters a character to which either the centralized or the diffused political organization is appropriate.

484. An examination of the facts, shows that where groups of the patriarchal type fall into regions permitting considerable growth of population, but having physical structures which impede the centralization of power, com-

pound political heads will arise, and for a time sustain themselves, through co-operation of the two factors—independence of local groups and need for union in war. Let us consider an example.

485. In its earliest-known state, Latium was occupied by village communities, which were united into cantons; while these cantons formed a league for defence headed by Alba —a canton regarded as the oldest and most eminent. The component cantons of the league were so far independent that there were wars between them; whence it may be inferred that when they co-operated for joint defence it was on substantially equal terms. Thus before Rome existed, the people who formed it had been habituated to a kind of life such that, with great subordination in each family and clan, and partial subordination within each canton (which was governed by a prince, council of elders, and assembly of warriors), there went a union of heads of cantons, who were in no degree subordinate one to another. As Mommson says, primitive Rome was "rather an aggregate of urban settlements than a single city." (*History of Rome.* Dickson's Trans. 1862. I. 30.) The constitution was in essence an oligarchy of heads of clans, included in an oligarchy of heads of houses—a compound oligarchy which became unqualified when kingship was suppressed. And here should be emphasized the truth, that the Roman Republic which remained when the regal power ended, differed utterly in nature from those popular governments with which it has been commonly classed. Institutions under which the head of each group had such supremacy that his wife and children, including even married sons, had no more legal rights than cattle, can be called free institutions only by those who confound similarity of external outline with similarity of internal structure.

486. That the formation of compound political heads in later times, repeats this process in essentials, if not in details, may be gathered from the histories of Venice and Switzerland. In one way or other, the result arises when

a common need for defence compels co-operation, while there exists no means of securing co-operation save voluntary agreement. We must not overlook here, the difference between the oligarchic form and the popular form of compound political heads. If each of the groups united by militant co-operation is despotically ruled—if they are framed on the patriarchal type, or are severally governed by men of supposed divine descent; then the compound head becomes one in which the people have no share. But if patriarchal authority or the belief in divine descent has decayed; or peaceful habits have weakened that coercive authority which war ever strengthens; then the compound head is no longer an assembly of petty despots, but is formed of those who exercise power not by right of position, but by right of appointment.

487. There are other conditions which favour the rise of compound heads, temporary if not permanent. Those, namely, which occur at the dissolutions of preceding organizations. The pre-existing regulative system having fallen, and political organization having to commence afresh, the form first assumed is akin to that which is exhibited in the assembly of the savage horde, or in the modern public meeting. Whence there presently results the rule of a select few subject to the approval of the many.

488. In the last division we saw that, as conditions determine, the first element of the tri-une political structure may be differentiated from the second in various degrees: beginning with the warrior-chief, slightly predominant over other warriors, and ending with the divine and absolute king widely distinguished from the select few next to him. Likewise, the second element is, as conditions determine, variously differentiated from the third: being at one extreme qualitatively distinguished in a high degree and divided from it by an impassable barrier, and at the other extreme almost merged into it. Not only do conditions determine the various forms which compound heads assume, but conditions determine the various changes they undergo.

There are two leading kinds of such changes—compound heads habitually become, in course of time, either narrower or wider. They are narrowed by militancy, which tends ever to concentrate directive power in fewer hands; and, if continued, almost certainly changes them into simple heads. Conversely, they are widened by industrialism. This, by gathering together aliens detached from the restraints imposed by patriarchal, feudal, or other such organizations; by increasing the number of those to be coerced in comparison with the number of those who have to coerce them; by placing this larger number in conditions favouring concerted action; and by substituting for daily-enforced obedience, the daily fulfilment of voluntary obligations and daily maintenance of claims; tends ever towards equalization of citizenship.

489. It is common to speak of a society as though it had, once upon a time, decided on the form of government which thereafter existed in it. But facts show that, as with the genesis of simple political heads, so with the genesis of compound political heads, conditions and not intentions determine.

VIII. CONSULTATIVE BODIES.

490. The first part of the primitive tri-une political structure has so far been considered as independent of the second part; and again, the second as independent of the first. Here we have to treat of the two in combination.

491. That the council of war, formed of leading warriors who debate in presence of their followers, is the germ out of which the consultative body arises, is implied by the survival of usages which show that a political gathering is originally a gathering of armed men. In harmony with this implication are such facts as that after a comparatively settled state has been reached, the power of the assembled people is limited to accepting or rejecting the proposals made, and that the members of the consultative body, summoned by

the ruler, who is also the general, give their opinions only when invited by him to do so.

492. Nor are clues wanting to the process by which the primitive war-council grows, consolidates, and separates itself. Within the warrior class, which we have seen was of necessity at the outset the landowning class, war produces increasing differences of wealth as well as increasing differences of *status;* so that, along with the compounding and recompounding of groups, brought about by war, the military leaders come to be distinguished as large landowners and local rulers. Hence members of the consultative body become contrasted with the freemen at large, not only as leading warriors are contrasted with their followers, but still more as men of wealth and authority.

493. This increasing contrast ends in separation when, in course of time, war consolidates large territories. Armed freemen scattered over a wide area are deterred from attending the periodic assemblies by cost of travel and time, and also by the experience that multitudes of men unprepared and unorganized, are helpless in presence of an organized few, better armed and mounted, and with bands of retainers. So that passing through a time during which only the armed freemen living near the place of meeting attend, there comes a time when even these, not being summoned, are considered as having no right to attend; and thus the consultative body becomes completely differentiated.

494. Changes in the relative powers of the ruler and the consultative body are determined by obvious causes. If the king retains or acquires the repute of supernatural descent or authority, and the law of hereditary succession is so settled as to exclude election, those who might else have formed a consultative body having co-ordinate power, become simply appointed advisers. But if the king has not the *prestige* of supposed sacred origin or commission, the consultative body retains power; and if the king continues to be elective, it is liable to become an oligarchy.

495. By militancy, then, the ruler is eventually separated from all below him; and the superior few integrated into a deliberative body, separated from the inferior many. Of course it is not alleged that all consultative bodies have been generated in the way described, or are constituted in like manner. The foregoing account applies only to what may be called normal consultative bodies, which grow up during that compounding of small societies into larger ones, which war effects.

IX. REPRESENTATIVE BODIES.

496. To see how a representative body arises, will prove to be more difficult than the foregoing forms of political organization. Both process and product being more variable, less specific results must suffice. Here we must limit ourselves to that kind of representative body which arises in communities occupying areas so large that their members are obliged to exercise by deputy such powers as they possess; and, further, we have to deal exclusively with cases in which the assembled deputies do not replace pre-existing political agencies but co-operate with them. From what part of the primitive political structure does the representative body, as thus conceived, originate?

497. Originally supreme, though passive, the third element in the tri-une political structure, subjected more and more as militant activity develops an appropriate organization, begins to re-acquire power when war ceases to be chronic. Subordination relaxes as fast as it becomes less imperative. Awe of the ruler, local or general, and accompanying manifestations of fealty, decrease; and especially so where the *prestige* of supernatural origin dies out. Where the life is rural the old relations long survive in qualified forms; but clans or feudal groups clustered together in towns, mingled with numbers of unattached immigrants, become in various ways less controllable; while by their habits their members are educated to increasing inde-

pendence. Progressing industrialism, dissolving in various ways the old relation of *status*, and substituting the new relation of contract, brings together masses of people who by their circumstances are enabled, and by their discipline prompted, to modify the political organization which militancy has bequeathed.

498. The origin of free forms of government is often attributed to such causes as the King's jealousy of the aristocracy inducing him to enlist the sympathies of the people and therefore to favour them; or from the people having profited by an alliance with the aristocracy in resisting royal tyrannies and exactions. These occurrences, however, do but furnish opportunities for the action of the pent-up force which is ready to work political changes. Three factors in this force may be distinguished:—The relative mass of those composing the industrial communities as distinguished from those embodied in the older forms of organization; the permanent sentiments and ideas produced in them by their mode of life; and the temporary emotions roused by special acts of oppression or by distress.

499. It is instructive to note how that primary incentive to co-operation which initiates social union at large, continues afterwards to initiate special unions within the general union. For just as external militancy sets up and carries on the organization of the whole, so does internal militancy set up and carry on the organization of the parts; even when those parts, industrial in their activities, are intrinsically non-militant.

500. How is the governmental influence of the people acquired? The primary purpose for which chief men and representatives are assembled, is for the purpose of voting money. As was shown when treating of Ceremonial Institutions, the revenues of rulers are derived, at first wholly and afterwards partially, from presents. This primary obligation to render money and service to the head of the State, often reluctantly complied with, is resisted when the exactions are great; and resistance causes conciliatory

measures. There comes asking assent rather than resort to compulsion.

501. From the ability to prescribe conditions under which money will be voted, grows the ability, and finally the right, to join in legislation. Such being the original connexion between support of the political head and protection by the political head, the interpretation of the actions of parliamentary bodies, when they arise, becomes clear. Just as in rude assemblies of king, military chiefs, and armed freemen, preserving in large measure the primitive form, the presentation of gifts went along with the transaction of public business, judicial as well as military, so when, after successful resistance to excess of royal power, there came assemblies of nobles and representatives summoned by the king, there re-appeared on a higher platform, these simultaneous demands for money on the one side and for justice on the other. The increasing mass of those who carry on life by voluntary, instead of compulsory, co-operation initiates popular representation.

502. In virtue of the general law of organization that difference of functions entails differentiation and division of the parts performing them, there comes a separation. At first summoned to the national assembly for purposes partially like and partially unlike those of its other members, the elected members show a segregating tendency, which, where the industrial portion of the community continues to gain power, ends in the formation of a representative body distinct from the original consultative body.

503. As we are here concerned only with the gradual evolution of representative bodies, an account of those which have been in modern days all at once created is not called for. Colonial legislatures illustrate the genesis of senatorial and representative bodies in but a restricted sense: showing, as they do, how the structures of parent societies reproduce themselves in derived societies; but not showing how these structures were originated.

X. MINISTRIES.

504. Men chosen by the ruler to help him, are met with in early stages of social evolution. Recognizing the fact that at the outset, these administrative agents, whatever further characters they have, are usually also soldiers, and are included in the primitive consultative body, of which they become specialized parts, it may be said of them generally, that they are relatives, friends, attendants, priests, brought into close relations with the ruler, out of whom he is obliged by stress of business to choose assistants; and that at first vague and irregular, their appointments and functions gradually acquire definiteness.

505. With the extension of territory, the increase of affairs, and the growth of classes having special interests, there come into play influences which differentiate some of those who surround the ruler into public functionaries, distinguished from members of his family and his household. And these influences determine the kinds of public men who come into power. Where the absoluteness of the political head is little or not at all restrained, he makes arbitrary choice irrespective of rank, occupation, or origin. If, being predominant, there are nevertheless classes of whom he is jealous, exclusion of these becomes his policy; while if his predominance is inadequate, representatives of such classes are forced into office. And this foreshadows the system under which, along with decline of monarchical power, there grows up an incorporated body of ministers having for its recognized function to execute the public will.

506. Were elaboration desirable, a good deal might here be added respecting the development of ministries. For such ends as are here in view, it suffices to recognize the general facts above set forth.

XI. LOCAL GOVERNING AGENCIES.

507. The regulative system based on blood-relationship is liable to be involved with, and subordinated by, a regulative system originating from military leadership. Let us consider first the local governing agency originating in political headships, as being most nearly related to the central governing agencies hitherto dealt with.

508. Generally, after war, the victor either finds it necessary, or his best policy, to respect the substantial autonomies of the vanquished societies. Hence, before integration has proceeded far, local governments are usually nothing more than those governments of the parts which existed before they were united into a whole.

509. The gradual disappearance of local autonomies is a usual outcome of the struggle between the governments of the parts, which try to retain their powers, and the central government, which tries to diminish their powers. The local rulers lose their directive powers and become executive agents only; discharging whatever duties they retain as the servants of newer local agents.

510. A further truth to be noted is that there habitually exists a kinship in structure between the general government and the local governments (assuming unity of race), consequent on the fact that both are ultimately products of the same individual nature. With a central despotism there goes local despotic rule; with a freer form of the major government there goes a freer form of the minor governments; and a change either way in the one is followed by a kindred change in the other.

511. Though with the massing of groups, political organization and rule become separate from, and predominant over, family organization and rule, locally as well as generally, yet family organization and rule do not disappear; but in some cases retaining their original nature, give origin to other local organizations of a governmental kind. The evidence shows that these communities of kindred

long survive, and partially retain their autonomies and their constitutions.

512. Social progress, however, transforms them in sundry ways—differentiating them into groups which gradually lose their family characters. Of the sundry influences which conspire to change the grouping of kindred into political grouping, locally as well as generally, there is in the first place, that admission of strangers into the family, gens, or tribe, which we have before recognized as a normal process, from savage life upwards. In the second place, when, by concentration and multiplication, different clusters of kindred placed side by side, become interspersed, and there ceases to be a direct connexion between locality and kinship, the family or gentile bonds are further weakened. And then there eventually results, both for military and fiscal purposes, the need for a grouping based on locality instead of relationship.

513. There remains to be dealt with an allied kind of local governing agency—a kind which, appearing to have been once identical with the last, eventually diverged from it. It is the governing agency of the gild. The continuance of a business, art, or profession, among descendants, is, in early stages, almost inevitable. Acquisition of skill in it by early practice is easy; the cost of teaching is inappreciable; and retention of the "craft" within the family is desirable. There being also the reason that while family-groups are in antagonism, the teaching of one another's members cannot usually be practicable. In course of time, adoption—as in the admission of an apprentice, a stranger in blood—which is practised by groups of all kinds, needs but to become common to cause the character of the gild as an assemblage of kindred to be obscured. The importance of the gild as a governing agency, and its probable evolution from the primitive compound family we shall see on naming the traits common to both:—the obligation of blood revenge; responsibility for transgressions of members; duty of maintaining incapable members; regulation of per-

sonal habits; and lastly, the carrying out of such punishments as excommunication and outlawry.

514. It may be added that these supplementary governing agencies, proper to the militant type of society, dissolve as the industrial type begins to predominate. Artificially restricting the actions of each member, and also making him responsible for others' deeds, they are at variance with that increasing assertion of individuality which accompanies developing industrialism.

XII. MILITARY SYSTEMS.

515. Much has already been said concerning the primitive identity of the political organization with the military organization. The several ways in which the two differentiate have now to be noted.

516. The progress from the state in which the incidence of military obligation is such that each free man has to serve personally, and also to provide his own arms and provisions, to a state in which war does but occasionally break the habitual industry, brings an increasing dissociation of military obligation from free citizenship: military obligation at the same time tending to become a pecuniary burden levied in proportion to property of whatever kind. Though where there is a conscription, personal service is theoretically due from each on whom the lot falls, yet the ability to buy a substitute brings the obligation back to a pecuniary one.

517. An aspect of this change not yet noted, is the simultaneous decrease in the ratio which the fighting part of the community bears to the rest. With the transition from nomadic habits to settled habits, there begins an economic resistance to militant action, which increases as industrial life develops, and diminishes the relative size of the military body.

518. With separation of the fighting body from the body politic at large, there very generally goes acquirement of a separate head. Active militancy ever tends to maintain

union of civil rule with military rule, and often causes re-union of them where they have become separate; but with the primary differentiation of civil from military structures, is commonly associated a tendency to the rise of distinct controlling centres for them. This tendency, often defeated by usurpation where wars are frequent, takes effect under opposite conditions; and then produces a military head subordinate to the civil head.

519. While, in the course of social evolution, there has been going on this separation of the fighting body from the community at large, this diminution in its relative mass, and this establishment of a distinct headship to it, there has been going on an internal organization of it. As in the primitive horde the progress is from the uncombined fighting of individuals to combined fighting under direction of a chief; so, on a larger scale, when small societies are united into great ones, the progress is from the independent fighting of tribal and local groups, to fighting under direction of a general commander. And to effect a centralized control, there arises a graduated system of officers, replacing the set of primitive heads of groups, and a system of divisions which, traversing the original divisions of groups, establish regularly-organized masses having different functions.

520. One further general change has to be noticed. The change from a state in which the army now assembles and now disperses, as required, to a state in which it becomes permanently established. While, as in early times, men are gathered together for small wars and then again dispersed, efficient organization of them is impracticable. It becomes practicable only among men who are constantly kept together by wars or preparations for wars; and bodies of such men growing up, replace the temporarily summoned bodies.

521. Lastly, it must be noted that while the army becomes otherwise distinguished, it becomes distinguished by retaining and elaborating the system of *status;* however widely the principle of voluntary co-operation comes into play throughout the civil part.

XIII. JUDICIAL AND EXECUTIVE SYSTEMS.

522. Evidences of sundry kinds unite in showing that judicial and military action, ordinarily having for their common end the rectification of real or alleged wrongs, are closely allied at the outset. The sword is the ultimate resort in either case: use of it being in the one case preceded by a war of words carried on before some authority whose aid is invoked, while in the other case it is not so preceded. Contention in court gradually takes the place of contention in arms.

523. Near akin as the judicial and military actions originally are, they are naturally at first discharged by the same agency—the primitive tri-une body formed of chief, head men, and people. This which decides on affairs of war and settles questions of public policy, also gives judgments concerning alleged wrongs of individuals and enforces its decisions.

524. According as the social activities develop one or other element of the primitive tri-une body, there results one or other form of agency for the administration of law. If continued militancy makes the ruling man all-powerful, he becomes absolute judicially as in other ways. If conditions favour the growth of the chief men into an oligarchy, the body they form becomes the agent for judging and punishing offences as for other purposes: its acts being little or not at all qualified by the opinion of the mass. While if the surrounding circumstances and mode of life are such as to prevent the supremacy of one man or of the leading men, its primitive judicial power is preserved by the aggregate of freemen—or is regained by it where it reacquires predominance.

525. In most cases where habitual militancy entails subjection of the people, the judicial organization which arises as the society enlarges and complicates, is officered by the sacerdotal class, or the military class, or partly the one and partly the other: their respective shares being

apparently dependent on the ratio between the degree of conscious subordination to the human and to the divine ruler, whose will the priests are supposed to communicate. But with the progress of industrialism and the rise of a class which, acquiring property and knowledge, gains consequent influence, the judicial system comes to be largely, and at length chiefly, officered by men derived from this class; and these men become distinguished from their predecessors not only as being of other origin, but also as being exclusively devoted to judicial functions.

526. From the early stages in which the ruler administers justice in person, now in one place and now in another; according as affairs, military or judicial, carry him to this or that place in his kingdom. We pass, with augmentation of the state business, to the appointment of deputies, to these being commissioned to hear pleas in the different counties, and eventually to the established circuits of judges who, like their prototypes, had to represent the king and exercise supreme authority.

527. With that development of a central government which accompanies consolidation of small societies into a large one, and with the consequent increase of its business, entailing delegation of functions, there goes, in the judicial organization as in other organizations, a progressive differentiation. The most marked being that between the lay, the ecclesiastical, and the military tribunals. From those early stages in which the popular assembly, with its elders and chief, condemned military defaulters, decided on ecclesiastical questions, and gave judgments about offences, there has gone on a divergence which, accompanied by disputes and struggles concerning jurisdiction, has parted ecclesiastical courts and courts martial from the courts administering justice in ordinary civil and criminal cases. Little trace as its structure now shows of such an origin, our complex judicial system, alike in its supreme central parts and in its various small local parts, has evolved by successive changes out of the primitive gathering of people, head men, and chiefs.

528. Were further detail desirable, there might here be given a *resumé* of police-systems; showing their evolution from the same primitive tri-une body whence originate the several organizations delineated in this and preceding divisions. As using force to subdue internal aggressors, police are like soldiers, who use force to subdue external aggressors; and the two functions, originally one, are not even now quite separate in their natures or their agents. For besides being so armed that they are in some countries scarcely distinguishable from soldiers, and besides being subject to military discipline, the police are, in case of need, seconded by soldiers in the discharging of their duties.

XIV. LAWS.

529. Setting out with the truth, illustrated even in the very rudest tribes, that the ideas conveyed, sentiments inculcated, and usages taught, to children by parents who themselves were similarly taught, eventuate in a rigid set of customs; we recognize the fact that at first, as to the last, law is mainly an embodiment of ancestral injunctions.

530. To the injunctions of the undistinguished dead, which, qualified by the public opinion of the living in cases not prescribed for, constitute the code of conduct before any political organization has arisen, there come to be added the injunctions of the distinguished dead, when there have arisen chiefs who, in some measure feared and obeyed during life, after death give origin to ghosts still more feared and obeyed. And when, during that compounding of societies effected by war, such chiefs develop into kings, their remembered commands and the commands supposed to be given by their ghosts—often through priests—become a sacred code of conduct, partly embodying and partly adding to the code pre-established by custom.

531. The living ruler, able to legislate only in respect of matters unprovided for, is bound by these transmitted

commands of the unknown and the known who have passed away; save only in cases where the living ruler is himself regarded as divine, in which cases his injunctions become laws having a like sacredness. Hence the trait common to societies in early stages, that the prescribed rules of conduct of whatever kind have a religious sanction. Sacrificial observances, public duties, moral injunctions, social ceremonies, habits of life, industrial regulations, and even modes of dressing, stand on the same footing.

532. Maintenance of the unchangeable rules of conduct thus originating, which is requisite for social stability during those stages in which the type of nature is yet but little fitted for harmonious social co-operation, pre-supposes implicit obedience; and hence disobedience becomes the blackest crime. Treason and rebellion, whether against the divine or the human ruler, bring penalties exceeding all others in severity. The breaking of a law is punished not because of the intrinsic criminality of the act committed, but because of the implied insubordination. The disregard of governmental authority continues, through subsequent stages, to constitute, in legal theory, the primary element in a transgression.

533. In societies that become large and complex, there arise forms of activity and intercourse not provided for in the sacred code; and in respect of these the ruler is free to make regulations. As such regulations accumulate there comes into existence a body of laws of known human origin; and though this acquires an authority due to reverence for the men who made it and the generations which approved it, yet it has not the sacredness of the god-descended body of laws: human law differentiates from divine law. But in societies which remain predominantly militant, these two bodies of laws continue similar in the respect that they have a personally-derived authority. The avowed reason for obeying them is that they express the will of a divine ruler, or the will of a human ruler, or, occasionally, the will of an irresponsible oligarchy. So long as the social type is one

organized on the principle of compulsory co-operation, law, having to maintain this compulsory co-operation, must be primarily concerned in regulating *status*, maintaining inequality, enforcing authority; and can but secondarily consider the individual interests of those forming the mass. But in proportion as the principle of voluntary co-operation more and more characterizes the social type, fulfilment of contracts and implied assertion of equality in men's rights, become the fundamental requirements, and the *consensus* of individual interests the chief source of law: such authority as law otherwise derived continues to have, being recognized as secondary, and insisted upon only because maintenance of law for its own sake indirectly furthers the general welfare.

534. Is it needful to remark that the systems of laws belonging to the successive social stages are severally accompanied by the sentiments and theories appropriate to them? The theories at present current, adapted to the existing compromise between militancy and industrialism, are steps towards the ultimate theory, in conformity with which law will have no other justification than that gained by it as maintainer of the conditions to complete life in the associated state.

535. Were it needful, we might here enter on the development of laws, not generally but specially; exhibiting them as accumulating in mass, as dividing and sub-dividing in their kinds, as becoming increasingly definite, as growing into coherent and complex systems, as undergoing adaptations to new conditions. Present requirements are satisfied, however, by the results above set forth.

XV. PROPERTY.

536. The desire to appropriate, and to keep that which has been appropriated, lies deep, not in human nature only, but in animal nature: being, indeed, a condition to survival. The consciousness that conflict, and consequent injury, may

probably result from the endeavour to take that which is held by another, ever tends to establish and strengthen the custom of leaving each in possession of whatever he has obtained by labour; and this custom takes among primitive men the shape of an overtly-admitted claim.

537. This claim to private ownership, primitively recognized in respect of movables and game killed, is not recognized in respect of tracts of territory. Property is individualized as far as circumstances allow individual claims to be marked off with some definiteness; but it is not individualized in respect of land, because, under the conditions, no individual claims can be shown, or could be effectually marked off were they shown.

538. With the passage from a nomadic to a settled state, ownership of land by the community becomes qualified by individual ownership; but only to the extent that those who clear and cultivate portions of the surface have undisturbed enjoyment of its produce. Habitually the public claim survives; and either when, after a few crops, the cleared tract is abandoned, or when, after transmission to descendants, it has ceased to be used by them, it reverts to the community. Where the patriarchal form of organization has been carried from the pastoral state into the settled state, and, sanctified by tradition, is also maintained for purposes of mutual protection, possession of land partly by the clan and partly by the family, long continues; at the same time that there is separate possession of things produced by separate labour. And while in some cases the communal land-ownership, or family land-ownership, survives, it in other cases yields in various modes and degrees to qualified forms of private ownership, mostly temporary, and subject to supreme ownership by the public.

539. But war, both by producing class-differentiations within each society, and by effecting the subjugation of one society by another, undermines or destroys communal proprietorship of land; and partly or wholly substitutes for it, either the unqualified proprietorship of an absolute conqueror,

or proprietorship by a conqueror qualified by the claims of vassals holding it under certain conditions, while their claims are in turn qualified by those of dependents attached to the soil. That is to say, the system of status which militancy develops, involves a graduated ownership of land as it does a graduated ownership of persons.

540. Complete individualization of ownership is an accompaniment of industrial progress. Accumulation of movables privately possessed, increases as militancy is restrained by growing industrialism; because this pre-supposes greater facility for disposing of industrial products; because there come along with it measures of quantity and value, furthering exchange; and because the more pacific relations implied, render it safer for men to detach themselves from the groups in which they previously kept together for mutual protection. The individualization of ownership, extended and made more definite by trading transactions under contract, eventually affects the ownership of land. Bought and sold by measure and for money, land is assimilated in this respect to the personal property produced by labour; and thus becomes, in the general apprehension, confounded with it. But there is reason to suspect that while private possession of things produced by labour, will grow even more definite and sacred than at present; the inhabited area, which cannot be produced by labour, will eventually be distinguished as something which may not be privately possessed. As the individual, primitively owner of himself, partially or wholly loses ownership of himself during the militant *régime*, but gradually resumes it as the industrial *régime* develops; so, possibly, the communal proprietorship of land, partially or wholly merged in the ownership of dominant men during evolution of the militant type, will be resumed as the industrial type becomes fully evolved.

541. The rise and development of arrangements which fix and regulate private possession, thus admit of tolerably clear definition.

XVI. REVENUE.

542. From the outset the growth of revenue has, like that growth of political headship which it accompanies, been directly or indirectly a result of war. The property of conquered enemies, at first goods, cattle, prisoners, and at a later stage, land, coming in larger share to the leading warrior, increases his predominance. To secure his goodwill, which it is now important to do, propitiatory presents and help in labour are given.

543. After presents freely given have passed into presents expected and finally demanded, and volunteered help has passed into exacted service, the way is open for a further step. Change from the voluntary to the compulsory, accompanied as it necessarily is by specification of the amounts of commodities and work required, is apt to be followed eventually by substitution of money payments: that is by taxes. During stages in which there has not arisen a circulating medium, the ruler, local or general, is paid his revenue in kind.

544. At the same time the growing power of the politica head enables him to enforce demands of many other kinds. As, in Norman England, in the sales of wardships, of charters to towns, and of permissions to trade.

545. Speaking generally of indirect taxes, it may be said that they at first differ from other exactions simply in this, that they are enforced on occasions when the subject is more than usually at the ruler's mercy; either because he is exposing commodities for sale where they can be easily found and a share taken; or because he is transferring them from one part of the territory to another, and can be readily stopped and a portion demanded; or because he is bringing commodities into the territory, and can have them laid hands on at one of the few places of convenient entrance. They are eventually transformed into percentages of value paid as tolls and duties.

546. Under free governments, as under despotic ones, war

continues to be the usual reason for imposing new taxes or increasing old ones; at the same time that the coercive organization in past times developed by war, continues to be the means of exacting them.

XVII. THE MILITANT TYPE OF SOCIETY.

547. It will be instructive here to arrange in coherent order, those traits of the militant type of society, already incidentally marked, and to join with them various dependent traits; and in the next division to deal in like manner with the industrial type.

548. To be in the highest degree efficient, the corporate action needed for preserving the corporate life must be joined in by everyone.

549. Other things being equal, the fighting power will be greatest where those who cannot fight, labour exclusively to support and help those who can. An evident implication being that the working part shall be no larger than is required for these ends.

550. The efforts of all being utilized directly or indirectly for war, will be most effectual when they are most combined; and, besides union among the combatants, there must be such union of the non-combatants with them as renders the aid of these fully and promptly available.

551. To satisfy these requirements, the life, the actions, and the possessions, of each individual must be held at the service of the society.

552. This universal service, this combination, and this merging of individual claims, presuppose a despotic controlling agency. That the will of the soldier-chief may be operative when the aggregate is large, there must be sub-centres and sub-sub-centres in descending grades, throughout the combatant and non-combatant parts.

553. The process of militant organization is a process of regimentation, which, primarily taking place in the army, secondarily affects the whole community.

554. As the commander tells the soldier both what he shall not do and what he shall do; so, throughout the militant community at large, the rule is both negatively regulative and positively regulative: it not only restrains, but it directs: the citizen as well as the soldier lives under a system of compulsory co-operation.

555. Development of the militant type involves increasing rigidity, since the cohesion, the combination, the subordination, and the regulation, to which the units of a society are subjected by it, inevitably decrease their ability to change their social positions, their occupations, and their localities.

556. A further trait of the militant type, naturally accompanying the last, is that organizations other than those forming parts of the State-organization, are wholly or partially repressed. The public combination occupying all fields, excludes private combinations.

557. A society of the militant type tends also to evolve a self-sufficient sustaining organization. Evidently, if it carries on frequent wars against surrounding societies, the supplies of all vital necessities must be provided internally.

558. And now having observed the traits which may be expected to establish themselves by survival of the fittest during the struggle for existence among societies, we find they are displayed in actual societies, similar in respect of their militancy but otherwise dissimilar. Taking the existing barbarous society of Dahomey, formed of negroes; the extinct semi-civilized empire of the Yncas, whose subjects were remote in blood from these; the ancient Egyptian Empire peopled by yet other races; the community of the Spartans, again unlike in the type of its men; and the existing Russian nation made up of Slavs and Tatars; we have before us cases in which such similarities of social structures as exist, cannot be ascribed to inheritance of a common character by the social units. The immense contrasts between the populations of these several societies, too, varying from millions at the one extreme to thousands

at the other, negative the supposition that their common structural traits are consequent on size. Nor can it be supposed that likenesses of conditions in respect of climate, surface, soil, flora, fauna, or likenesses of habit caused by such conditions, can have had anything to do with the likenesses of organization in these societies; for their respective habitats present numerous marked unlikenesses. Such traits as they one and all exhibit, not ascribable to any other cause, must thus be ascribed to the habitual militancy characteristic of them all. The results of induction alone would go far to warrant this ascription; and it is fully warranted by their correspondence with the results of deduction, as set forth above.

559. Any remaining doubts must disappear on observing how continued militancy is followed by further development of the militant organization. An example under our immediate observation will suffice to show this: that of the German Empire. Such traits of the militant type in Germany as were before manifest, have, since the late great war become still more manifest. The army has not only been largely increased but has become more consolidated; instead of the military supplies being voted annually, greatly increased amounts are now voted for seven years: steps obviously surrendering popular checks on Imperial power. Simultaneously, military officialism has been in two ways replacing civil officialism; subaltern officers are rewarded for long services by appointments to civil posts; and the ecclesiastical organization has become more subordinated by the political. Passing to the industrial activities we may note the progressive transfer of railways into the hands of the State; the extension of trade interferences—by protectionist tariffs, by revival of the usury laws, by restrictions on Sunday Labour. And lastly there come the measures for extending, directly and indirectly, the control over popular life. In all which changes there is progress towards the strengthening of restraints over the individual and regulation of his life in greater detail.

560. Lastly comes the evidence furnished by the adapted characters of the men who compose militant societies. Making success in war the highest glory, they are led to identify goodness with bravery and strength. Revenge becomes a sacred duty with them; and acting at home on the law of retaliation which they act on abroad, they similarly, at home as abroad, are ready to sacrifice others to self: their sympathies, continually deadened during war, cannot be active during peace. They must have a patriotism which regards the triumph of their society as the supreme end of action; they must possess the loyalty whence flows obedience to authority; and that they may be obedient they must have abundant faith. With faith in authority and consequent readiness to be directed, naturally goes relatively little power of initiation. The habit of seeing everything officially controlled fosters the belief that official control is everywhere needful; while a course of life which makes personal causation familiar and negatives experience of impersonal causation, produces an inability to conceive of any social processes as carried on under self-regulating arrangements. And these traits of individual nature, needful concomitants as we see of the militant type, are those which are displayed in the members of actual militant societies.

561. In three ways, then, we are shown the character of the militant type of social organization. That certain conditions, manifest, *a priori*, have to be fulfilled by a society for preserving itself in presence of antagonist societies. On inspecting sundry militant societies we are shown, *a posteriori*, that there are fundamental similarities of the kinds inferred *a priori*. And lastly comes the evidence furnished by the adapted characters of the men who compose militant societies.

XVIII. THE INDUSTRIAL TYPE OF SOCIETY.

562. The traits of the industrial type are so hidden by those of the still-dominant militant type, that its nature is

nowhere more than very partially exemplified. Throughout our interpretations we must keep in view the truth, that the structures and functions proper to the industrial type distinguish themselves but gradually from those proper to the militant type. Let us now consider the traits of that social organization which, entirely unfitted for carrying on defence against external enemies, is exclusively fitted for maintaining the life of the society by subserving the lives of its units.

563. While corporate action is the primary requirement in a society which has to preserve itself in presence of hostile societies, conversely, in the absence of hostile societies, corporate action is no longer the primary requirement.

564. Such corporate action as remains has for its end to guard individual actions against all interferences not necessarily entailed by mutual limitation: the type of society in which this function is best discharged, being that which must survive, since it is that of which the members will most prosper.

565. The requirements of the industrial type exclude also a despotic controlling agency.

566. Such control as is required under the industrial type, can be exercised only by an appointed agency for ascertaining and executing the average will; and a representative agency is the one best fitted for doing this.

567. The function of this controlling agency, generally defined as that of administering justice, is more specially defined as that of seeing that each citizen gains neither more nor less of benefit than his activities normally bring; and there is thus excluded all public action involving any artificial distribution of benefits.

568. The *régime* of status proper to militancy having disappeared, the *régime* of contract which replaces it has to be universally enforced; and this negatives interferences between efforts and results by arbitrary apportionment.

569. Otherwise regarded, the industrial type is distinguished from the militant type as being not both positively

regulative and negatively regulative, but as being negatively regulative only. To the member of the industrial community, authority says "thou shalt not" and not "thou shalt."

570. With the relatively narrow range of public organizations, there goes, in the industrial type, a relatively wide range of private organizations. The spheres left vacant by the one are filled by the other.

571. Two indirectly resulting traits of the industrial type must be added. The first is its relative plasticity, determined by the underlying principle of efficiency.

572. The second is the tendency towards the breaking down of the divisions between nationalities, and the running through them of a common organization.

573. If we compare the traits of European societies in mediæval times, with their traits in modern times, the following essential differences are shown, inductively bearing out the traits just arrived at by deduction. First, with the formation of nations covering large areas, the perpetual wars within each area have ceased; and though the wars between nations which from time to time occur are on larger scales, they are less frequent, and they are no longer the business of all free men. Second, there has grown up in each country a relatively large population which carries on production and distribution for its own maintenance; so that whereas of old, the working part existed for the benefit of the fighting part, now the fighting part exists mainly for the benefit of the working part: it exists ostensibly to protect it in the quiet pursuit of its ends. Third, the system of status, having under some of its forms disappeared and under others become greatly mitigated, has been almost universally replaced by the system of contract. Only among those who, by choice or by conscription, are incorporated in the military organization, does the system of status in its primitive rigour still hold so long as they remain in this organization. Fourth, with this decrease of compulsory co-operation and increase of voluntary co-operation, there

have diminished or ceased many minor restraints over individual actions. Men are less tied to their localities than they were; they are not obliged to profess certain religious opinions; they are less debarred from expressing their political views; they no longer have their dresses and modes of living dictated to them; they are comparatively little restrained from forming private combinations and holding meetings for one or other purpose—political, religious, social. Fifth, while the individualities of citizens are less aggressed upon by public agency, they are more protected by public agency against aggression. Instead of a *régime* under which individuals rectified their private wrongs by force as well as they could, or else bribed the ruler, general or local, to use his power in their behalf, there has come a *régime* under which, while much less self-protection is required, a chief function of the ruling power and its agents is to administer justice. In all ways, then, with this relative decrease of militancy and relative increase of industrialism, there has been a change from a social order in which individuals exist for the benefit of the State, to a social order in which the State exists for the benefit of individuals.

574. As, in the last division, we noted the traits of character proper to the members of a society which is habitually at war; so here, we have to note the traits of character proper to the members of a society occupied exclusively in peaceful pursuits. An examination of the evidence furnished by certain small groups of uncivilized and unwarlike peoples shows that these peoples, free from the coercive rule which warlike activities necessitate, and without the sentiment which makes the needful subordination possible—maintaining their own claims while respecting the claims of others—devoid of the vengeful feelings which aggressions without and within the tribe generate; display, in unusual degrees, the humane sentiments, instead of the bloodthirstiness, the cruelty, the selfish trampling upon inferiors, characterizing militant tribes and societies. And

these superiorities of the social relations in permanently peaceful tribes, go with superiorities of the domestic relations. Of course on turning to the civilized to observe the form of individual character which accompanies the industrial form of society, we encounter the difficulty that the personal traits proper to industrialism, are, like the social traits, mingled with those proper to militancy. Nevertheless, on contrasting the characters of our ancestors during more warlike periods with our own characters, we see that, with an increasing ratio of industrialism to militancy, have come a growing independence, a less-marked loyalty, a smaller faith in governments, and a more qualified patriotism; and while, by enterprising action, by diminished faith in authority, by resistance to irresponsible power, there has been shown a strengthening assertion of individuality, there has accompanied it a growing respect for the individualities of others, as is implied by the diminution of aggressions upon them and the multiplication of efforts for their welfare.

575. As with the militant type then, so with the industrial type, three lines of evidence converge to show its essential nature. To prevent misapprehension it seems needful, before closing, to explain that these traits are to be regarded less as the immediate results of industrialism than as the remote results of non-militancy. It is not so much that a social life passed in peaceful occupations is positively moralizing, as that a social life passed in war is positively demoralizing. Sacrifice of others to self is in the one incidental only; while in the other it is necessary.

XIX. POLITICAL RETROSPECT AND PROSPECT.

576. In the foregoing divisions little has been said concerning the doctrine of Evolution at large, as re-illustrated by political evolution. To the observant reader it will be sufficient to point out that with the advance from small incoherent social aggregates to great coherent ones, which,

while becoming integrated pass from uniformity to multiformity, there goes an advance from indefiniteness of political organization to definiteness of political organization. It must be added that these changes in societies present varieties of characters under varieties of conditions, and alter as the conditions alter. Different parts of a society display the transformation, according as the society's activities are of one or other kind.

577. Recognizing the fact that with social organisms as with individual organisms, the evolution of superior types does not entail the extinction of all inferior ones, but leaves many of these to survive in habitats not available by the superior, we may here restrict ourselves to the inquiry—What are likely to be the forms of political organization and action in societies that are favourably circumstanced for carrying social evolution to its highest stage?

578. Glancing first at political structures. It appears to be an unavoidable inference that the ultimate executive agency must become, in some way or other, elective; since hereditary political headship is a trait of the developed militant type, and forms a part of the *régime* of status which is excluded by the hypothesis. Guided by such evidence as existing advanced societies afford us, it is to be inferred that the highest State-office, in whatever way filled, will continue to decline in importance; and that the functions to be discharged by its occupant will become more and more automatic. No speculations concerning ultimate political forms can, however, be regarded as anything more than tentative; for we may be sure that the future will bring unforeseen political arrangements along with many other unforeseen things. There will probably be considerable variety in the special forms of the political institutions of industrial societies: all of them bearing traces of past institutions which have been brought into congruity with the representative principle. And here may be added the fact, that little stress need be laid on one or other speciality of form; since, given citizens having the presupposed appro-

priate natures, and but small differences in the ultimate effects will result from differences in the machinery used.

579. Turning now to political functions, we have seen that when corporate action is no longer needed for preserving the society as a whole from destruction or injury by other societies, the end which remains for it is that of preserving the component members of the society from destruction or injury from one another: injury, as here interpreted, including not only immediate, but also remote, breaches of equity.

580. With this limitation of State-functions, it is probable that there will be simultaneously carried further that trait which already characterizes the most industrially-organized societies—the performance of increasingly-numerous and increasingly-important functions by other organizations than those which form departments of the government. Already in our own case, private enterprise, working through incorporated bodies of citizens, achieves ends undreamed of as so achievable in primitive societies; and in the future, other ends undreamed of now as so achievable, will be achieved.

581. A corollary having important practical bearings may be drawn. The several changes making up the transformation above indicated, are normally connected in their amounts; and mischief must occur if the due proportions among them are not maintained. There is a certain right relation to one another, and a right relation to the natures of citizens, which may not be disregarded with impunity.

582. But the conclusion of profoundest moment to which all lines of argument converge, is that the possibility of a high social state, political as well as general, fundamentally depends on the cessation of war. Persistent militancy, maintaining adapted institutions, must inevitably prevent, or else neutralize, changes in the direction of more equitable institutions and laws; while permanent peace will of necessity be followed by social ameliorations of every kind. May the foregoing divisions lead some to think whether the ar-

rangements they are advocating involve increase of that public regulation characterizing the militant type, or whether they tend to produce that greater individuality and more extended voluntary co-operation, characterizing the industrial type.

CHAPTER XXIII.

ECCLESIASTICAL INSTITUTIONS.

"Tracing the differentiation of religious government from secular; its successive complications and the multiplication of sects; the growth and continued modification of religious ideas, as caused by advancing knowledge and changing moral character; and the gradual reconciliation of these ideas with the truths of abstract science."

I. THE RELIGIOUS IDEA.

583. There can be no true conception of a structure without a true conception of its function. To understand how an organization originated and developed, it is requisite to understand the need subserved at the outset and afterwards. Rightly to trace the evolution of Ecclesiastical Institutions, therefore, we must know whence came the ideas and sentiments implied by them. Are these innate or are they derived? They are derived. Alike in those minds among the civilized which, by defective senses, have been cut off from instruction, and in the minds of various primitive peoples, religious conceptions do not exist.

584. Religious ideas have not, then, that supernatural origin commonly alleged; and we are taught, by implication, that they have a natural origin. How do they originate? In "The Data of Sociology" we saw an account of primitive ideas at large; and especially of ideas concerning the natures and actions of supernatural agents. It will perhaps assist the reader to re-state as succinctly as possible the chief factors and stages in the genesis of religious beliefs.

585. From the ordinary absence of the other-self in sleep, and its extraordinary absences in swoon, apoplexy, etc.,

the transition is to its unlimited absence at death; when, after an interval of waiting, the expectation of immediate return is given up. Still the primitive belief is that the other-self either does from time to time return, or will eventually return. Commonly, the spirit is supposed to linger near the body or revisit it, and to have the same sensations and emotions as the living man. Hence the universality among the uncivilized and semi-civilized of ministrations to the double of the deceased, habitually made at the funeral, and often times continued. The habitat of the other-self is variously conceived; though everywhere there is an approach to parallelism between the life here and the imagined life hereafter. Along with development of grave-heaps into altars, grave-sheds into religious edifices, and food for the ghost into sacrifices, there goes on the development of praise and prayer. Turning to certain more indirect results of the ghost theory, we find that, distinguishing but confusedly between semblance and reality, the savage thinks that the representation of a thing partakes of the properties of the thing. Hence the effigy of a dead man becomes a habitation for his ghost; and idols, because of the indwelling doubles of the dead, are propitiated. Identification of the doubles of the dead with animals—now with those which frequent houses or places which the doubles are supposed to haunt, and now with those which are like certain of the dead in their malicious or beneficent natures—is in other cases traceable to misinterpretation of names; this latter leading to identification of stars with persons, and hence to star and Sun-worship. In their normal forms, as in their abnormal forms, all gods arise by apotheosis. Originally, the god is the superior living man, whose power is conceived as superhuman. As, in primitive thought, divinity is synonymous with superiority; and as at first a god may be either a powerful living person, or a dead person who has acquired supernatural power as a ghost; there come two origins for semi-divine beings—the one by unions between the conquering god-race and the conquered race distin-

guished as men, and the other by supposed intercourse between living persons and spirits; as in the beliefs in incubi and succubi lasting in European history down to comparatively late times. Thus, where the evidence is examined, comparative sociology discloses a common origin for each leading element of religious belief. The conception of the ghost, along with the multiplying and complicating ideas arising from it, is found everywhere—alike in the arctic regions and in the tropics; in the forests of North America and in the deserts of Arabia; in the valleys of the Himalayas and in African jungles; on the flanks of the Andes and in the Polynesian islands. It is exhibited with equal clearness by races so remote in type from one another, that competent judges think they must have diverged before the existing distribution of land and sea was established—among straight-haired, curly-haired, woolly-haired races; among white, tawny, copper-coloured, black. And it is found among peoples who have made no advances in civilization as well as among the semi-civilized and the civilized. Thus we have abundant proofs of the natural genesis of religions.

586. The saying that one half the world does not know how the other half lives, may be paralleled by the saying that one half the world has no idea what the other half thinks, and what it once thought itself. Ordinarily in adult life many thoughts and feelings of childhood have faded so utterly that there is an incapacity for even imagining them; and, similarly, from the consciousness of cultured humanity there have so completely disappeared certain notions natural to the consciousness of uncultured humanity, that it has become almost incredible that they should ever have been entertained. But just as certain as it is that the absurd beliefs at which parents laugh when displayed in their children, were once their own; so certain is it that advanced peoples to whom primitive conceptions seem ridiculous, had forefathers who held these primitive conceptions. Their own theory of things has arisen by slow

modification of that original theory of things in which, from the supposed reality of dreams, there resulted the supposed reality of ghosts; whence developed all kinds of supposed supernatural beings.

587. Are we to conclude that amid the numerous religions, varying in their forms and degrees of elaboration, which have this common origin, there exists one which has a different origin? Are we to make an exception of the religion current among ourselves? If, in seeking an answer, we compare this supposed exceptional religion with the others, we do not find it so unlike them as to imply an unlike genesis. Contrariwise, it presents throughout remarkable likenesses to them. If we say that its likenesses to the rest hide a transcendent unlikeness, several implications must be recognized. One is that the Cause to which no limits can be put in Space or Time, and of which our entire Solar system is a relatively infinitesimal product, took the disguise of a man for the purpose of covenanting with a shepherd-chief in Syria. Another is that this Energy, unceasingly manifested everywhere, throughout past, present, and future, ascribed to himself under this human form, not only the limited knowledge and limited powers which various passages show Jahvah to have had, but also moral attributes which would now be thought discreditable to a human being. And a third is that we must suppose an intention even more repugnant to our moral sense. For if the numerous parallelisms between the Christian religion and other religions, which the evidence shows, do not prove likeness of origin and development, then the implication is that a complete simulation of the natural by the supernatural has been deliberately devised to deceive those who examine critically what they are taught. Appearances have been arranged for the purpose of misleading sincere inquirers that they may be eternally damned for seeking the truth.

588. On those who accept this last alternative, no reasonings will have any effect. Here we part company with them by accepting the First. And, accepting it, shall find that

Ecclesiastical Institutions are at once rendered intelligible in their rise and progress.

II. MEDICINE-MEN AND PRIESTS.

589. A satisfactory distinction between priests and medicine-men is difficult to find. Both are concerned with supernatural agents, which in their original forms are ghosts; and their ways of dealing with these supernatural agents are so variously mingled, that at the outset no clear classification can be made.

590. If we remember that in primitive belief the doubles of the dead, like their originals in all things, admit of being similarly dealt with, and may therefore be induced to yield benefits or desist from inflicting evils, by bribing them, praising them, asking their forgiveness, or by deceiving and cajoling them, or by threatening, frightening, or coercing them; we may see that the modes of dealing with ghosts, broadly contrasted as antagonistic and sympathetic, initiate the distinction between medicine-man and priest.

591. Without alluding to the relatively unimportant social developments which originate from the medicine-man, we may note that he occasionally grows politically powerful, that he sometimes becomes the object of a cult after his death, and that during civilization he has varieties of decreasingly-conspicuous descendants, who, under one or other name, using one or other method, are supposed to have supernatural power or knowledge.

592. When there has evolved a mythology having gradations of supernatural beings, the priest, usurping the medicine-man's functions, comes to play the part of an exorcist by calling on a friendly supernatural being to drive out some inferior supernatural being who is doing mischief.

593. This priest-class, becoming, as it does, conspicuous and powerful, and acquiring as society develops an organization often very elaborate, and a dominance sometimes supreme, must now be dealt with at length.

III. PRIESTLY DUTIES OF DESCENDANTS.

594. Prompted as offerings on graves originally are by affection for the deceased, and called forth as praises are by actual regrets for his or her departure, it naturally happens that these propitiations are made more by relatives than others.

595. Hence the truth, everywhere illustrated, that those who perform the offices of the primitive cult are, at the outset, children or other members of the family.

596. An interpretation is thus furnished of the fact that in undeveloped societies the priestly function is generally diffused. We have now to observe that the family-cult acquires a more definite form by the devolution of its functions on one member of the family.

IV. ELDEST MALE DESCENDANTS AS QUASI-PRIESTS.

597. In conformity with the law of the instability of the homogeneous, the propitiatory function, from being common to descendants in general, falls into the hands of one member of the group.

598. Hence certain sequences, as in ancient Egypt where "it was most important that a man should have a son established in his seat after him who should perform the due rites [of sacrifice to his *ka* or double] and see that they were performed by others." (*Origin and Growth of Religion as illustrated by the Religion of Ancient Egypt.* P. le P. Renouf. Hibbert Lectures, 1880. 138). To obtain male issue the Chinese allow even a second wife.

599. The primitive and long-surviving belief in a second life repeating the first in its needs, prompted surprising usages for procuring an actual or nominal son who should minister to these needs. That these obligations to the dead had a religious character, is shown by the fact that where they have survived down to our own day, they take precedence of all other obligations.

600. The early ideas of the claim supposed to be made by the double of the dead man on his property and his heir, are well shown by the ancient examples of the way in which a son speaks of, or speaks to, his actual or nominal father who has died.

601. Facts also show that devolution of the sacrificial office accompanies devolution of property, for this has to bear the costs of the sacrifices; and also that, under the patriarchal type of society in its first stages, the domestic, the political, and the ecclesiastical, are undistinguished.

V. THE RULER AS PRIEST.

602. If from the primitive belief that the double of the dead man will presently return and resume his life, there results the conception that the son who holds his property and ministers to him from its proceeds is but a deputy, then this fusion of the sacred with the secular is a corollary.

603. While the growth of the family into the cluster of families, ending in the formation of the village-community, which often includes affiliated strangers, involves that the patriarch ceases to have the threefold character of domestic, political, and ecclesiastical head, his character remains twofold: he habitually retains the functions of ruler and priest. This connexion of offices is everywhere found in early stages of social evolution; and it continues through later stages.

604. Propitiations of the doubles of dead men, made at first by all their relatives and afterwards by heads of families, come to be somewhat distinguished when made by the head of the most powerful family. With increased predominance of the powerful family, and conception of the ghost of its deceased head as superior to other ghosts, there arises the wish, at first in some, then in more, and then in all, to propitiate him. And this wish eventually generates the habit of making offerings and prayers to him through his ruling descendant, whose priestly character thus becomes decided.

605. We have now to observe how, with the progress of social evolution, the sacerdotal function comes to be performed more and more by proxy.

VI. THE RISE OF A PRIESTHOOD.

606. As shown in *Sociology*, §§ 480 and 504, with increase of a chief's territory, there comes an accumulation of business which necessitates the employment of assistants. Among the functions deputed is that of priest, which, at first temporarily assumed by a brother, or other member of the family, is permanently assumed where the chief's occupations increase. This restriction to members of a ruling family, usual in early stages, may be considered the normal differentiation; since the god being the apotheosized ancestor, the sacrifices made to him continue to be the sacrifices made by descendants.

607. But while this is the usual origin of a priesthood, there are other origins. Besides the influence which the chief or his priestly relative is supposed to have with powerful supernatural beings there is the competing influence ascribed to the sorcerer or rainmaker. Or the tribe may be joined by an immigrant stranger, who, in virtue of superior knowledge or arts, excites awe; and an additional cult may result either from his teachings, or from his own apotheosis.

608. Moreover, a leader of a migrating portion of the tribe, if in some way specially distinguished, is likely at death to become himself the object of a worship competing with the traditional worship, and perhaps initiating another priesthood.

609. In verification of the above, there is evidence showing that in tribes which lead peaceful lives, and in which considerable advances have been made with the establishment of strong personal governments, and therefore without the rise of apotheosized chiefs serving as village gods, there is but a feeble marking off of the priest-class.

VII. POLYTHEISTIC AND MONOTHEISTIC PRIESTHOODS.

610. The rise of that which is distinguished as polytheism, appears to result in several ways; it will suffice here to name the two more important. The one is a concomitant of the division and spreading of tribes which outgrow their means of subsistence: when within each separated sub-tribe there eventually arises, as there inevitably will, some distinguished chief or medicine-man, his greatly-feared ghost becomes to all the members of the sub-tribe a new local god, in addition to the more ancient one. The other is an accompaniment of conquest: the conquerors, not destroying the worships of the conquered, bring their own worships, and either carry them on among themselves only, or make the conquered join in them; in either case multiplying the varieties of priests.

611. The frequent genesis of new worships and continued coexistence of many worships, severally having their priesthoods, may appear anomalous. Many facts however make it clear that not only the genesis of polytheism, but the long survival of it, are sequences of primitive ancestor-worship.

612. Just as the subjects of a living chief, for one reason or another dissatisfied with his rule, will some of them desert him and attach themselves to a neighbouring chief; so, among a polytheistic people, disappointments will cause alienation from a deity who has proved obstinate, and propitiation of a deity who it is hoped will be more conceding. Chiefly, however, inequalities among the ascribed powers of gods, where many coexist, are due to conquests.

613. Eventually there results under favouring conditions a gravitation towards monotheism. And with such an advance there goes an advance towards unification of priesthoods. The official propitiators of minor deities dwindle away and disappear; while the official propitiators of the deity who has come to be regarded as the most powerful, or as the possessor of all power, become established everywhere.

614. These influences are reinforced by that of advancing

culture and accompanying speculative capacity. Once having been set up, the change towards monotheism goes on with increasing momentum among the highest intelligences.

615. Rightly to conceive the evolution of monotheism and its accompanying ecclesiastical institutions, we must take note of several influences which qualify it. The earlier tendencies towards the rise of a supreme deity are apt to prove abortive, for the maintenance of the supremacy, requires that traditions shall be well preserved, and the social state lend itself to orderly observances. Another fact respecting the evolution of monotheisms out of polytheisms —a fact congruous with the hypothesis that they are thus evolved—is that they do not become complete; or, at least, do not maintain their purity. Further, where polytheism under its original form has been suppressed by a monotheism more or less complete, it habitually revives under a new form.

VIII. ECCLESIASTICAL HIERARCHIES.

616. The component institutions of each society habitually exhibit kindred traits of structure.

617. Where the political organization is but little developed, there is but little development of the ecclesiastical organization; while along with a centralized coercive rule there goes a religious rule no less centralized and coercive. Qualifications required to meet changes caused in the one case by revolutions and in the other case by substitutions of creeds, do not seriously affect it.

618. Likeness between the ecclesiastical and political organizations where they have diverged, is largely due to their community of origin in the sentiment of reverence. Ready obedience to a terrestrial ruler is naturally accompanied by ready obedience to a supposed celestial ruler; and the nature which favours growth of an administration enforcing the one, favours growth of an administration enforcing the other.

619. Along with increase of a priesthood in size, there habitually go those specializations which constitute it a hierarchy. Integration is accompanied by differentiation. Whether the cult is an indigenous or an invading one, there results a hierarchy of sacerdotal functionaries analogous in its general principles of organization to the graduated system of political functionaries. In the one case, as in the other, the differentiation, setting out from a state in which power is distributed with approximate uniformity, advances to a state in which, while the mass becomes entirely subordinate, the controlling agency displays within itself a subordination of the many to the few and to the one.

620. Among leading traits in the development of ecclesiastical institutions, have to be added the rise and establishment of monasticism, which, beginning as usual in a dispersed unorganized form, by-and-by came to have a common mode of government and life. Though in their early days monks were regarded as men more holy than the clergy, they did not exercise clerical functions; but in the fifth and sixth centuries they acquired some of these, and in so doing became subject to bishops: the result being a long struggle to maintain independence on the one side and to enforce authority on the other, which ended in practical incorporation with the Church, and a further complication of the hierarchy.

621. As we are here concerned only with the general aspects of the evolution of ecclesiastical hierarchies, no further account of them is needed.

IX. AN ECCLESIASTICAL SYSTEM AS A SOCIAL BOND.

622. The social influences which ecclesiastical institutions exert, originate in the feelings entertained towards the dead. The burial of a late parent is an occasion on which the members of the family gather together and become bound by a renewed sense of kinship; on which any antagonism between them is suspended; and on which they are further

united by being subject to the deceased man's wishes, and made, in so far, to act in concert.

623. The sentiment of filial piety thus manifesting itself, enlarges in its sphere when the deceased man is the patriarch, or founder of the tribe, or the hero of the race. But be it in worship of a god or funeral of a parent, we ever see the same three influences—strengthening of union, suspension of hostilities, reinforcement of transmitted commands.

624. The parallelism between suspension of family animosities at funerals, and temporary cessation of hostilities between clans on occasions of common religious festivals, is shown by fighting being forbidden in the burial places of chiefs; by the weekly suspension of feudal fights under the influence of the Church; and by the threat of excommunication maintaining peace between kings.

625. No less clearly do the facts justify the analogy between the recognized duty of fulfilling a deceased parent's wishes, and the imperative obligation of conforming to a divinely-ordained law. Evidently, bodies of laws regarded as supernaturally given by the traditional god of the race, habitually tend to restrain the anti-social actions of individuals towards one another, and to enforce concerted action in the dealings of the society with other societies.

626. The general influence of Ecclesiastical Institutions is conservative in a double sense. In several ways they maintain and strengthen social bonds, and so conserve the social aggregate; and they do this in large measure by conserving beliefs, sentiments, and usages which, evolved during earlier stages of society, are shown by its survival to have had an approximate fitness to the requirements, and are likely still to have it in a great measure.

627. Generally it may be said that ecclesiasticism, above all other agencies, stands for the principle of social continuity; not only between the coexisting parts of a nation, but also between its present generation and its past generations. Even irrespective of the relative fitness of the

inherited cult to the inherited social circumstances, there is an advantage in, if not indeed a necessity for, acceptance of traditional beliefs, and consequent conformity to the resulting customs and rules.

X. THE MILITARY FUNCTIONS OF PRIESTS.

628. Among the many errors which result from carrying back advanced ideas and sentiments to the interpretation of primitive institutions, few are greater than that of associating priestly functions with actions classed as high in kind, and dissociating them from brutal and savage actions. Recognizing the truth that the gods of savages and of partially-civilized peoples, were originally ferocious chiefs and kings whose ghosts were propitiated by carrying out their aggressive or revengeful projects; we may see that their official propitiators, so far from being at first associated in doctrine and deed with the higher traits of human nature, were in both associated with the lower.

629. The truth that in the normal order the chief, who is originally the greatest warrior, is also the primitive priest, implies union of military and sacerdotal functions in the same person. Beyond this union of functions in leaders, there occur cases in which active parts in fighting are taken by priests.

630. After recognizing the fact that at the outset, active ecclesiastical headship is united with active military headship; and after recognizing the fact that throughout later stages these two headships remain nominally united with headship of the State; we may go on to observe that very soon, priests usually cease to be direct participators in war, and become indirect participators only. Their share in battle being that of inspiring prompters, divinely enlightened advisers, or war ministers.

631. The history of mediæval Europe proves undeniably that conditions which cause a recrudescence of militancy, re-establish the primitive union of soldier and priest, not-

withstanding a cult which forbids bloodshed. Re-establish it just as completely as though the cult were of the most sanguinary kind. Only as peace begins to predominate, does the priest lose his semi-warlike character.

632. Lastly, let us note that the differentiation of these two functions of fighting enemies and propitiating deities, which were originally joined with headship of the State, has gone furthest in those religious organizations which are separate from the State. Dissenting ministers are the least militant of religious functionaries.

XI. THE CIVIL FUNCTIONS OF PRIESTS.

633. Of course where the head of the State, himself regarded as god-descended, plays the part of priest in propitiating the ancestral gods, and, unlimited in his authority, carries his rule into all spheres, the union of civil functions with sacerdotal functions is complete.

634. This union continues also where the king is believed to have divine sanction only. For habitually in such cases he is either nominal head or real head of the ecclesiastical organization; and while ordinarily occupied with civil functions, assumes on great occasions sacerdotal functions.

635. We pass by a step, in many cases only nominal, from the civil functions of the priest as central or local ruler, to the civil function of the priest as judge only—as judge coexisting with, but separate from, the political head.

636. Along with a large share in the administration of justice possessed by priests in countries where, or times when, they are supposed to be inspired with divine wisdom, or utterers of divine injunctions, priests also have in such places and times, a large share in the control of State affairs as ministers or advisers: a sequence to be expected in cults originating from worship of dead rulers.

637. But as with the military functions of priests so with their civil functions, social development, ever accompanied by specialization, more and more restricts them.

XII. CHURCH AND STATE.

638. In the case of the originally undistinguished Church and State, as in all cases, various causes subsequently conspire to produce differentiation and increasing separation. Co-operating efficiently though they at first do as having interests in large measure the same, yet the agencies for carrying on celestial rule and terrestrial rule eventually begin to compete for supremacy; and the competition joins with the growing unlikenesses of functions and structures in making the two organizations distinct.

639. To understand this struggle for supremacy we must glance at the sources of sacerdotal power. First comes the claim of the priest, as representing the deity, to give a sanction to the authority of the civil rulers. Next may be named the supposed influence of the priest with supernatural beings—to obtain blessings and to forgive sins. Then in early societies they form the cultured class; acquire great influence as teachers of the civil rulers; and lastly have the power resulting from accumulation of property, for wealth—whether derived from fees, gifts, or bribes—everywhere tends to flow to the ecclesiastical organization.

640. With the development and specialization of functions of Church and State, there arise differences of aim between the two; and a consequent question whether the living ruler, with his organization of civil and military subordinates, shall or shall not yield to the organization of those who represent dead rulers and profess to utter their commands. If, throughout the society, faith is unqualified and terror of the supernatural extreme, the temporal power becomes subject to the spiritual power.

641. There are reasons for thinking that the change from an original predominance of the spiritual power over the temporal power to ultimate subjugation of it, is mainly due to the development of industrialism, with the moral and intellectual changes it enjoins.

XIII. NONCONFORMITY.

642. Nothing like that which is now called Nonconformity can be traced in societies of simple types. Devoid of the knowledge and the mental tendencies which lead to criticism and scepticism, the savage passively accepts whatever his seniors assert.

643. But when, along with social development, Nonconformity does arise, the thing specially to be noted is the attitude assumed towards ecclesiastical government. Though there is always some exercise of individual judgment; yet in early stages this is shown merely in the choice of one authority as superior to another. Only in late stages does there come an exercise of individual judgment which goes to the extent of denying ecclesiastical authority in general.

644. The growing movement for disestablishment of the Church in England—the logical outcome of the Protestant theory—shows this later tendency. Liberty of thought, long asserted and more and more displayed, is about to be carried to the extent that no man shall be constrained to support another man's creed.

645. It remains to add that the spread of Nonconformity is an indirect result of growing industrialism. The moral nature fostered by a social life carried on under voluntary co-operation works out religious independence as it works out political freedom.

XIV. THE MORAL INFLUENCES OF PRIESTHOODS.

646. As has been previously said, there exists in most minds an erroneous association between religious ministrations and moral teachings. In what ways, then, have Ecclesiastical Institutions affected men's natures?

647. They have furthered social growth and development by maintaining a common propitiation of a deceased ruler's spirit; by fostering that spirit of conservatism which maintains continuity in social arrangements; by forming a

supplementary regulative system which co-operates with the political one; by insisting on obedience, primarily to gods and secondarily to kings; by countenancing the coercion under which has been cultivated the power of application; and by strengthening the habit of self-restraint.

648. As, originally, the dedication of anything to a god is made either by a priest or by a chief in his priestly capacity, we must class it as an Ecclesiastical Institution; and the fostering of respect for proprietary rights which grows out of it, must be counted among the beneficial disciplines which these institutions give.

649. Whether the modifications of nature produced by the discipline common to all creeds, are accompanied by modifications of higher kinds, depends partly on the traditional accounts of the gods worshipped, and partly on the social conditions. Religious obedience is the primary duty; and this, in early stages, often furthers increase of ferocity.

650. Multitudinous anomalies occur, however—anomalies which seem unaccountable till we recognize the truth that in all cases the one thing which precedes in importance the special injunctions of a cult, is the preservation of the cult itself and the institutions embodying it.

651. With the change from a more militant to a more industrial state, comes a reformed ethical creed, which increases or decreases in its influence according as the social activities continue peaceful or again become warlike. Little as such reformed ethical creed (presently accepted as of divine origin) operates during periods when war fosters sentiments of enmity instead of amity, advantage is gained by having it in reserve for enunciation whenever conditions favour.

XV. ECCLESIASTICAL RETROSPECT AND PROSPECT.

652. Among social phenomena, those presented by Ecclesiastical Institutions illustrate very clearly the general

law of evolution. From the primitive undifferentiated social aggregate in which domestic, civil, and religious subordination are at first carried on in like ways by the same agencies, the definite, coherent and heterogeneous Ecclesiastical organization develops.

653. With structural differentiations must here be joined a functional differentiation of deep significance. Two sacerdotal duties which were at first parts of the same, have been slowly separating; and the one which was originally unobtrusive but is now conspicuous, has become in large measure independent. The original duty is the carrying on of worship; the derived duty is the insistence on rules of conduct. Evidence furnished by many peoples and times shows that the propitiatory element, which is the primary element, diminishes with the advance of civilization, and becomes qualified by the growing ethical element.

654. Though Ecclesiastical Institutions hold less important places in higher societies than in lower societies, we must not infer that they will hereafter wholly disappear. If in times to come there remain functions to be fulfilled in any way analogous to their present functions, we must conclude that they will survive under some form or other.

655. As there must ever continue our relations to the unseen and our relations to one another, it appears not improbable that there will survive certain representatives of those who in the past were occupied with observances and teachings concerning these two relations; however unlike their sacerdotal prototypes such representatives may become.

XVI. RELIGIOUS RETROSPECT AND PROSPECT.

656. Briefly recapitulating, we find that in the primitive human mind there exists neither religious idea nor religious sentiment; that with advancing civilization there comes the divergence of the supernatural being from the natural being—a divergence which gradually becomes more decided; that there is nothing to check the gradual de-materialization

of the ghost and of the god; which is insensibly furthered in the effort to reach consistent ideas of supernatural action; that the god ceases to be tangible, and that later he ceases to be visible or audible. Along with which differentiation of physical attributes from those of humanity, there goes on more slowly a differentiation of mental and emotional attributes. Thus, in the course of social evolution and the evolution of intelligence accompanying it, there are generated both the ideas and sentiments which we distinguish as religious; and that through a process of causation clearly traceable, they traverse those stages which have brought them, among civilized races, to their present forms.

657. What may we infer will be the evolution of religious ideas and sentiments throughout the future? Two factors must be taken into account. There is the development of those higher sentiments which no longer tolerate the ascription of inferior sentiments to a divinity; and there is the intellectual development which causes dissatisfaction with the crude interpretations previously accepted.

658. These and other difficulties must force men hereafter to drop the higher anthropomorphic characters given to the First Cause, as they have long since dropped the lower. The conception which has been enlarging from the beginning must go on enlarging, until, by disappearance of its limits, it becomes a consciousness which transcends the forms of distinct thought, though it for ever remains a consciousness.

659. The objection that, if the primitive belief was absolutely false, all derived beliefs must be false, looks fatal; and it would be fatal were its premise valid. Unexpected as it will be to most readers, the answer here to be made is that at the outset a germ of truth was contained in the primitive conception—the truth, namely, that the power which manifests itself in consciousness is but a differently-conditioned form of the power which manifests itself beyond consciousness.

660. Those who think that science is dissipating religious beliefs and sentiments, seem unaware that whatever of mystery is taken from the old interpretation is added to the new. Or rather, we may say that transference from the one to the other is accompanied by increase; since, for an explanation which has a seeming feasibility, science substitutes an explanation which, carrying us back only a certain distance, there leaves us in presence of the avowedly inexplicable. One truth must grow ever clearer—the truth that there is an Inscrutable Existence everywhere manifested, to which the man of science can neither find nor conceive either beginning or end. Amid the mysteries which become the more mysterious the more they are thought about, there will remain the one absolute certainty, that he is ever in presence of an Infinite and Eternal Energy, from which all things proceed.

Here, in accordance with the programme of the "System of Synthetic Philosophy," should follow chapters on "Industrial Organization," "Lingual Progress," "Intellectual Progress," "Æsthetic Progress," and "Moral Progress." These parts, however, are not yet written. Mr. Spencer being led "to deviate from the order originally set down, by the fear that persistence in conforming to it might result in leaving the final work of the series ["The Principles of Morality"] unexecuted . . . A failure the probability of which I [Mr. Spencer] dò not like to contemplate;" Though the "first division of the work terminating the Synthetic Philosophy, cannot, of course, contain the specific conclusions to be set forth in the entire work; yet it implies them in such wise that, definitely to formulate them requires nothing beyond logical deduction."

The next chapter therefore treats of the first part of

PART V.

"THE PRINCIPLES OF MORALITY."

CHAPTER XXIV.

THE DATA OF ETHICS.

"Generalizations furnished by Biology, Psychology and Sociology, which underlie a true theory of right living: in other words, the elements of that equilibrium between constitution and conditions of existence, which is at once the moral ideal and the limit towards which we are progressing."

I. CONDUCT IN GENERAL.

1. The doctrine that correlatives imply one another—that a father cannot be thought of without thinking of a child—has for one of its common examples the necessary connexion between the conceptions of whole and part. Beyond the primary truth that no idea of a whole can be framed without a nascent idea of parts constituting it, and that no idea of a part can be framed without a nascent idea of some whole to which it belongs, there is the secondary truth that there can be no correct idea of a part without a correct idea of the correlative whole.

2. Hence, just as, fully to understand the part of conduct which Ethics deals with, we must study human conduct as a whole; so, fully to understand human conduct as a whole, we must study it as a part of that larger whole constituted by the conduct of animate beings in general. We have also to look upon the conduct now displayed by creatures of all orders, as an outcome of the conduct which has brought life of every kind to its present height. And this is tantamount to saying that our preparatory step must be to study the evolution of conduct.

II. THE EVOLUTION OF CONDUCT.

3. We have to frame a conception of the evolution of conduct, as correlated with the evolution of structures and functions. Excluding all internal co-ordinations, our subject here is the aggregate of all external co-ordinations; and this aggregate includes not only the simplest as well as the most complex performed by human beings, but also those performed by all inferior beings considered as less or more evolved.

4. Bearing in mind that conduct is distinguished from the totality of actions by excluding purposeless actions—What constitutes advance in the evolution of conduct, as we trace it up from the lowest types of living creatures to the highest? It is the more numerous and better adjustment of acts to ends. As we may see on comparing the infusorium and the rotifer, the floating ascidian and the cephalopod, the fish and the elephant, the savage and the civilized man. This improving adjustment of acts to ends not only furthers prolongation of life, but it also furthers increased amount of life. Each further evolution of conduct widens the aggregate of actions while conducing to elongation of it.

5. In tracing up the evolution of conduct, we must also recognize those adjustments which have for their final purpose the life of the species. Speaking generally, neither can evolve without evolution of the other; and the highest evolution of the two must be reached simultaneously.

6. It is an error to suppose, however, that either of these kinds of conduct can assume its highest form, without its highest form being assumed by a third kind of conduct yet to be named. Beyond so behaving that each achieves his ends without preventing others from achieving their ends, the members of a society may give mutual help in the achievement of ends, and thus their conduct may assume a still higher phase of evolution.

7. These implications of the Evolution hypothesis, we

shall now see harmonize with the leading moral ideas men have otherwise reached.

III. GOOD AND BAD CONDUCT.

8. We may gather from the foregoing that the conduct to which we apply the name good, is the relatively more evolved conduct; and that bad is the name we apply to conduct which is relatively less evolved. We regard as good the conduct furthering self-preservation, and as bad the conduct tending to self-destruction. Parental conduct is called good or bad, as it increases or decreases the power of perpetuating the species by fostering progeny. And that form of conduct is most emphatically termed good which is such that life may be completed in each and in his offspring, not only without preventing completion of it in others, but with furtherance of it in others. Conduct called good rises to the conduct conceived as best, when it simultaneously achieves the greatest totality of life in self, in offspring, and in fellow-men.

9. In the optimistic proposition, tacitly made when using the words good and bad after the ordinary manner; and in the pessimistic proposition overtly made, which implies that the words good and bad should be used in the reverse senses; does examination disclose any proposition which, contained in both of them, may be held more certain than either—any universally-asserted proposition?

10. Yes, there is one postulate in which pessimists and optimists agree. Both their arguments assume it to be self-evident that life is good or bad, according as it does, or does not, bring a surplus of agreeable feeling. The implication common to their antagonist views is, that conduct should conduce to preservation of the individual, of the family, and of the society, only supposing that life brings more happiness than misery.

11. Analysis of the standards of the different moral schools shows that every one of them derives its authority

from this ultimate standard; whether perfection of nature is the assigned proper aim, or virtuousness of action, or rectitude of motive. Let us here consider them separately, with the view of showing that all their tests of goodness are derivative.

12. It is strange that a notion so abstract as that of perfection, should ever have been thought one from which a system of guidance can be evolved. Perfection is synonymous with goodness in the highest degree; and hence to define good conduct in terms of perfection, is indirectly to define good conduct in terms of itself. Naturally, therefore, it happens that the notion of perfection like the notion of goodness can be framed only in relation to ends.

13. Pass we now to the view of those moralists who make virtuousness of action the standard. If virtue is primordial and independent, no reason can be given why there should be any correspondence between virtuous conduct and conduct that is pleasure-giving in its total effects on self, or others, or both; and if there is not a necessary correspondence, it is conceivable that the conduct classed as virtuous should be pain-giving in its total effects. Which is impossible, for examination will show that the conception of virtue cannot be separated from the conception of happiness-producing conduct.

14. The intuitionist, who regards the feelings of liking and aversion we have to acts of certain kinds as divinely given, does not, and cannot, ignore the ultimate derivations of right and wrong from pleasure and pain. However much he may be guided, and rightly guided, by the decisions of conscience respecting the characters of acts; he has come to have confidence in these decisions because he perceives that conformity to them furthers the welfare of himself and others, and that disregard of them entails in the long run suffering on all.

15. Even with those who judge of conduct from the religious point of view, rather than from the ethical point of view, it is the same. Men who seek to propitiate God

by inflicting pains on themselves, or refrain from pleasures to avoid offending him, do so to escape greater ultimate pains or to get greater ultimate pleasures. If by positive or negative suffering here, they expected to achieve more suffering hereafter, they would not do as they do. That which they now think duty they would not think duty if it promised eternal misery instead of eternal happiness. Nay, if there be any who believe that human beings were created to be unhappy, and that they ought to continue living to display their unhappiness for the satisfaction of their creator, such believers are obliged to use this standard of judgment; for the pleasure of their diabolical god is the end to be achieved.

16. In conclusion then, we may say that no school can avoid taking for the ultimate moral aim a desirable state of feeling called by whatever name—gratification, enjoyment, happiness. Pleasure somewhere, at some time, to some being or beings, is an inexpugnable element of the conception. It is as much a necessary form of moral intuition as space is a necessary form of intellectual intuition.

IV. WAYS OF JUDGING CONDUCT.

17. All the current methods of ethics, irrespective of their distinctive characters and their special tendencies, have one general defect—they neglect ultimate causal connexions. Not that they wholly ignore the natural consequences of actions; but they recognize them only incidentally. Whether theological, political, intuitional, or utilitarian, they do not erect into a method the ascertaining of necessary relations between causes and effects, and deducing rules of conduct from formulated statements of them.

18. The school of morals properly to be considered as the still-extant representative of the most ancient school, is that which recognizes no other rule of conduct than the alleged will of God. This notion, that such and such actions are made respectively good and bad simply by divine

injunction, is tantamount to the notion that such and such actions have not in the nature of things such and such kinds of effects. If there is not here an unconsciousness of causation there is an ignoring of it.

19. Following Plato, Aristotle, and Hobbes, not a few modern thinkers hold that there is no other origin for good and bad in conduct than law. They allege that rights are wholly results of convention: the necessary implication being that duties are so too. If however murders, thieving, non-fulfilment of contract, cheating, adulteration, etc., etc., whether forbidden by law or not, work mischiefs on a community in proportion as they are common, quite irrespective of prohibitions; then, is it not manifest that the like holds throughout all the details of men's behaviour? Here, again, there is a theory betraying deficient consciousness of causation.

20. Nor is it otherwise with the pure intuitionists. For to affirm that we know some things to be right and other things to be wrong, only by virtue of a supernaturally-given conscience, is tacitly to deny any natural relations between acts and results.

21. Strange to say, even the utilitarian school is very far from completely recognizing natural causation. Members of this school suppose that in future, as now, utility is to be determined only by observation of results; and that there is no possibility of knowing by deduction from fundamental principles, what conduct *must* be detrimental and what conduct *must* be beneficial.

22. If we trace to their ultimate ramifications the effects wrought by any of the acts which morality called intuitive reprobates—if we ask what results not to the individual himself only, but also to his belongings; we see that, by the necessary connexions of things, these acts, besides tending primarily to lower the life of the individual aggressed upon, tend, secondarily, to lower the lives of all his family, and, thirdly to lower the life of society at large; which is damaged by whatever damages its units.

22, *bis*. Thus, then, all the current methods of ethics neglect ultimate causal connexions. Ethics, including as it does part of the sciences of physics, biology, psychology, and sociology, can find its ultimate interpretations only in those fundamental truths which are common to all of them. Moral phenomena forming a part of the aggregate of phenomena which evolution has wrought out, we have now to consider them as phenomena of evolution.

23. Utilizing the conclusions contained in the preceding chapters, let us now observe what data are furnished by them.

V. THE PHYSICAL VIEW.

24. Here, we have to ask whether conduct, considered as a set of combined motions, displays in increasing degrees the traits of evolution, as it rises to its higher forms; and whether it does not display them in the greatest degree when it reaches that highest form which we call moral.

25. Man, even in his lowest state, displays in his conduct far more coherent combinations of motions than the lower animals, and the civilized man—who shows connexions between past, present, and future motions—than the savage. Again, in proportion as the conduct is what we call moral, it exhibits comparatively settled connexions between antecedents and consequents: the combined motions are more coherent.

26. Indefiniteness accompanies incoherence in conduct that is little evolved; and throughout the ascending stages of evolving conduct, there is an increasingly-definite coordination of the motions constituting it. Compared to the lower animals, human conduct, even in its lowest stages, displays much greater definiteness, if not in the combined movements forming single acts, still in the adjustments of many combined acts to various purposes. Moral conduct is more definite than immoral: the conscientious man is exact in all his transactions.

27. Throughout the ascending forms of life, along with increasing heterogeneity of structure and function, there goes increasing heterogeneity of conduct. If the conduct is the best possible on every occasion, it follows that as the occasions are endlessly varied the acts will be endlessly varied to suit—the heterogeneity in the combinations of motions will be extreme.

28. The increasing coherence, definiteness, and heterogeneity, of the combined motions, are instrumental to the better maintenance of a moving equilibrium. Where the evolution is small this is very imperfect and soon cut short; with advancing evolution, bringing greater power and intelligence, it becomes more steady and longer continued in face of adverse actions; in the human race at large it is comparatively regular and enduring; and its regularity and enduringness are greatest in the highest.

29. This presentation of moral conduct in physical terms may appear strange. It has been needful to make it, however, to show that there is an entire correspondence between moral evolution and evolution as physically defined.

VI. THE BIOLOGICAL VIEW.

30. That which was physically defined as a moving equilibrium, we define biologically as a balance of functions. The moral man is one whose functions are all discharged in degrees duly adjusted to the conditions of existence.

31. Strange as the conclusion seems, it is nevertheless a conclusion to be here drawn, that—presupposing as we do an ideal humanity—the performance of every function is, in a sense, a moral obligation. ..

32. In treating of conduct under its biological aspect, we are compelled to consider that interaction of feelings and functions, which is essential to animal life in all its more developed forms.

33. In two ways it is demonstrable that there exists a primordial connexion between pleasure-giving acts and

continuance or increase of life, and, by implication, between pain-giving acts and decrease or loss of life. On the one hand, setting out with the lowest living things, examination will show that the beneficial act and the act which there is a tendency to perform, are originally two sides of the same act; and cannot be disconnected without fatal results. On the other hand, were we to contemplate developed creatures as now existing, we should see that each individual and species is from day to day kept alive by pursuit of the agreeable and avoidance of the disagreeable. We thus come to another face of that ultimate truth previously disclosed: that it is impossible to frame ethical conceptions from which the consciousness of pleasure is absent. For this necessity of thought originates in the very nature of sentient existence. Sentient existence can evolve only on condition that pleasure-giving acts are life-sustaining acts.

34. Having in view certain beneficial results that are preceded by disagreeable states of consciousness, such as those commonly accompanying labour; and having in view the injurious results that follow the receipt of certain gratifications, such as those which excess in drinking produces; the majority believe that the bearing of pains is on the whole beneficial, and that the receipt of pleasures is detrimental. The exceptions so fill their minds as to exclude the rule.

35. Mankind, inheriting from creatures of lower kinds, such adjustments between feelings and functions as concern fundamental bodily requirements, has been subject to a change of conditions unusually great and involved. This has considerably deranged the guidance by sensations, and in a much greater degree the guidance by emotions. The result is that in many cases pleasures are not connected with actions which must be performed, nor pains with actions which must be avoided, but contrariwise.

36. Biology has a further judgment to pass on the relations of pleasures and pains to welfare. Every pleasure increases vitality; every pain decreases vitality. Every pleasure raises the tide of life; every pain lowers the tide of

life. As it is one of the laws of nervous action that each stimulus, beyond a direct discharge to the particular organ acted on, indirectly causes a general discharge throughout the nervous system (*Psychology*, §§ 21, 39), it results that the rest of the organs, all influenced as they are by the nervous system, participate in the stimulation. So that beyond the aid, more slowly shown, which the organs yield to one another through the physiological division of labour, there is the aid, more quickly shown, which mutual excitation gives.

37. Non-recognition of these general truths vitiates moral speculation at large. From the estimates of right and wrong habitually framed, these physiological effects wrought on the actor by his feelings are entirely omitted. The direct and indirect sufferings caused by nonconformity to the laws of life, are the same whatever induces the nonconformity; and cannot be omitted in any rational estimate of conduct. If the purpose of ethical inquiry is to establish rules of right living; and if the rules of right living are those of which the total results, individual and general, direct and indirect, are most conducive to human happiness; then it is absurd to ignore the immediate results and recognize only the remote results.

38. The ethical theories which are characterized by these perversions, are products of, and are appropriate to, the forms of social life which the imperfectly adapted constitutions of men produce. With complete adjustment of humanity to the social state, will go recognition of the truths that actions are completely right only when, besides being conducive to future happiness, special and general, they are immediately pleasurable, and that painfulness, not only ultimate but proximate, is the concomitant of actions which are wrong.

39. Like the physical view, then, the biological view corresponds with the view gained by looking at conduct in general from the standpoint of Evolution.

VII. THE PSYCHOLOGICAL VIEW.

40. Here we have to consider represented pleasures and pains, sensational and emotional, as constituting deliberative motives—as forming factors in the conscious adjustments of acts to ends.

41. Symbolizing by *a* and *b*, related phenomena in the environment, which in some way concern the welfare of the organism; and symbolizing by *c* and *d*, the impressions, simple or compound, which the organism receives from the one, and the motions, single or combined, by which its acts are adapted to meet the other. Psychology in general is concerned with the connexion between the relation *a b* and the relation *c d*. By implication the psychological aspect of Ethics, is that aspect under which the adjustment of *c d* to *a b*, appears, not as an intellectual co-ordination simply, but as a co-ordination in which pleasures and pains are alike factors and results.

42. Throughout Evolution, motive and act become more complex, as the adaptation of inner related actions to outer related actions extends in range and variety. Whence follows the corollary that the later evolved feelings, more representative and re-representative in their constitution, and referring to remoter and wider needs, have, on the average, an authority as guides greater than have the earlier and simpler feelings.

43. The general truth disclosed by the study of evolving conduct, sub-human and human, that for the better preservation of life the primitive, simple, presentative feelings must be controlled by the later-evolved, compound, and representative feelings, has come, in the course of civilization, to be recognized by men; but necessarily at first in too indiscriminate a way. The current conception, while it errs by implying that the authority of the higher over the lower is unlimited, errs also by implying that the rule of the lower must be resisted even when it does not conflict with the rule of the higher, and further errs by implying

that a gratification which forms a proper aim if it is remote, forms an improper aim if it is proximate.

44. This conscious relinquishment of immediate and special good to gain distant and general good, while it is a cardinal trait of the self-restraint called moral, is also a cardinal trait of self-restraints other than those called moral —the restraints that originate from fear of the visible ruler, of the invisible ruler, and of society at large. Whenever the individual refrains from doing that which the passing desire prompts, lest he should afterwards suffer legal punishment, or divine vengeance, or public reprobation, or all of them, he surrenders the near and definite pleasure rather than risk the remote and greater, though less definite, pains, which taking it may bring on him; and, conversely, when he undergoes some present pain, that he may reap some probable future pleasure, political, religious, or social. But though all these four kinds of internal control have the common character that the simpler and less ideal feelings are consciously overruled by the more complex and ideal feelings; and though, at first, they are practically coextensive and undistinguished; yet, in the course of social evolution they differentiate; and, eventually, the moral control with its accompanying conceptions and sentiments, emerges as independent.

45. The moral motive differs from the motives it is associated with in this, that instead of being constituted by representations of incidental, collateral, non-necessary consequences of acts, it is constituted by representations of consequences which the acts naturally produce. And now we may see why the moral feelings and correlative restraints have arisen later than the feelings and restraints that originate from political, religious, and social authorities; and have so slowly, and even yet so incompletely, disentangled themselves. For only by these lower feelings and restraints could be maintained the conditions under which the higher feelings and restraints evolve. Only after political, religious, and social restraints have produced a stable community, can

there be sufficient experience of the pains, positive and negative, sensational and emotional, which crimes of aggression cause, as to generate that moral aversion to them constituted by consciousness of their intrinsically evil results.

46. One further question has to be answered—How does there arise the feeling of moral obligation in general? Whence comes the sentiment of duty, considered as distinct from the several sentiments which prompt temperance, providence, kindness, justice, &c.? The answer is that it is an abstract sentiment generated in a manner analogous to that in which abstract ideas are generated. Emerging as the moral motive does but slowly from amidst the political, religious, and social motives, it long participates in that consciousness of subordination to some external agency which is joined with them; and only as it becomes distinct and predominant does it lose this associated consciousness—only then does the feeling of obligation fade. Hence, the startling conclusion that the sense of duty or moral obligation is transitory, and will diminish as fast as moralization increases. With complete adaptation to the social state, that element in the moral consciousness which is expressed by the word obligation, will disappear.

47. And this brings us to the psychological aspect of that conclusion which, in the last division, was reached under its biological aspect. The pleasures and pains which the moral sentiments originate, will, like bodily pleasures and pains, become incentives and deterrents so adjusted in their strengths to the needs, that the moral conduct will be the natural conduct.

VIII. THE SOCIOLOGICAL VIEW.

48. From the sociological point of view, Ethics becomes nothing else than a definite account of the forms of conduct that are fitted to the associated state, in such wise that the lives of each and all may be the greatest possible, alike in length and in breadth.

49. Unlike sets of conclusions respecting human conduct emerge, according as we are concerned with a state of habitual or occasional war, or are concerned with a state of permanent and general peace. Let us glance at these alternative states and the alternative implications.

50. At first the welfare of social groups, habitually in antagonism with other such groups, takes precedence of individual welfare; and the rules of conduct which are authoritative for the time being, involve incompleteness of individual life that the general life may be maintained. At the same time the rules have to enforce the claims of individual life as far as may be; since on the welfare of the units the welfare of the aggregate largely depends.

51. But gradually as war declines—gradually as the compulsory co-operation needful in dealing with external enemies becomes unnecessary, and leaves behind the voluntary co-operation which effectually achieves internal sustentation; there grows increasingly clear the code of conduct which voluntary co-operation implies. And this final permanent code alone admits of being definitely formulated, and so constituting ethics as a science in contrast with empirical ethics.

52. What shape must the mutual restraints take when co-operation begins? Or rather—What, in addition to the primary mutual restraints, are those secondary mutual restraints required to make co-operation possible? Only under voluntary agreement, no longer tacit and vague but overt and definite, can co-operation be harmoniously carried on when division of labour becomes established. The failure of either to surrender to the other that which was avowedly recognized as of like value with the labour or product given, tends to prevent co-operation by exciting discontent with its results. And evidently, while antagonisms thus caused impede the lives of the units, the life of the aggregate is endangered by diminished cohesion.

53. The universal basis of co-operation is the proportioning of benefits received to services rendered. Without

this there can be no physiological, nor sociological, division of labour. And since division of labour, physiological or sociological, profits the whole and each part; it results that on maintenance of the arrangements necessary to it, depend both special and general welfare. In a society such arrangements are maintained only if bargains, overt or tacit, are carried out. So that beyond the primary requirement to harmonious coexistence in a society, that its units shall not directly agress on one another, there comes this secondary requirement, that they shall not indirectly aggress by breaking agreements.

54. But now we have to recognize the fact that complete fulfilment of these conditions, original and derived, is not enough. The limit of evolution of conduct is not reached, until, beyond avoidance of direct and indirect injuries to others, there are spontaneous efforts to further the welfare of others.

55. Thus the sociological view of Ethics supplements the physical, the biological, and the psychological views, by disclosing those conditions under which alone associated activities can be so carried on, that the complete living of each consists with, and conduces to, the complete living of all.

IX. CRITICISMS AND EXPLANATIONS.

56. Some elucidation of the questions involved, will be obtained by here considering certain views and arguments set forth by past and present moralists.

57. The objection made by Mr. Sidgwick to the hedonistic method—the difficulties in the way of hedonistic calculation—contains a truth, but includes with it an untruth. For while the proposition that happiness, whether individual or general, is the end of action, is not invalidated by proof that it cannot under either form be estimated by measurement of its components; yet it may be admitted that guidance in the pursuit of happiness by a mere balancing of pleasures and pains, is, if partially practicable throughout

a certain range of conduct, futile throughout a much wider range. It is quite consistent to assert that happiness is the ultimate aim of action, and at the same time to deny that it can be reached by making it the immediate aim. Mr. Sidgwick is correct as far as the conclusion that "we must at least admit the desirability of confirming or correcting the results of such comparisons [of pleasures and pains] by any other method upon which we may find reason to rely;" (*The Methods of Ethics.* 1877. 134,) here we may go further, and say that throughout a large part of conduct guidance by such comparisons is to be entirely set aside and replaced by other guidance.

58. Recognizing the truth that the pleasures of pursuit are much more those derived from the efficient use of means than those derived from the end itself, we are led to a fact of profound significance. During evolution there has been a superposing of new and more complex sets of means upon older and simpler sets of means; and a superposing of the pleasures accompanying the uses of these successive sets of means; with the result that each of these pleasures has itself eventually become an end. As fast as, for the better maintainance of life, the simpler sets of means and the pleasures accompanying the uses of them, come to be supplemented by the more complex sets of means and their pleasures, these begin to take precedence in time and in imperativeness.

59. These relations between means and ends are traceable throughout later stages of evolving conduct; and hold true of human conduct, up even to its highest forms. To use effectually each more complex set of means becomes the proximate end, and the accompanying feeling becomes the immediate gratification sought; though there may be, and habitually is, an associated consciousness of the remoter ends and remoter gratifications to be obtained.

60. Coming now to the doctrine of Bentham:—That the supreme legislative body ought to make the greatest happiness of the greatest number its immediate aim. What does

it imply? It implies that happiness may be compassed by methods framed directly for the purpose, without any previous inquiry respecting the conditions that must be fulfilled; and this presupposes a belief that there are no such conditions. For if there are any conditions without fulfilment of which happiness cannot be compassed, then the first step must be to ascertain these conditions with a view to fulfilling them; and to admit this is to admit that not happiness itself must be the immediate end, but fulfilment of the conditions to its attainment must be the immediate end. The alternatives are simple:—Either the achievement of happiness is not conditional, in which case one mode of action is as good as another, or it is conditional, in which case the required mode of action must be the direct aim and not the happiness to be achieved by it.

61. Harmonious co-operation, by which alone in any society the greatest happiness can be attained, is, as we saw, made possible only by respect for one another's claims: there must be neither those direct aggressions which we class as crimes against person and property, nor must there be those indirect aggressions constituted by breaches of contracts. So that maintenance of equitable relations between men, is the condition to attainment of greatest happiness in all societies; however much the greatest happiness attainable in each may differ in nature, or amount, or both.

62. Recognizing in due degrees all the various ethical theories, conduct in its highest form will take as guides, innate perceptions of right duly enlightened and made precise by analytic intelligence; while conscious that these guides are proximately supreme solely because they lead to the ultimately supreme end, happiness special and general.

X. THE RELATIVITY OF PAINS AND PLEASURES.

63. A truth of cardinal importance as a datum of Ethics must here be set forth. It is that not only men of different

races, but also different men of the same race, and even the same men at different periods of life, have different standards of happiness.

64. Though there is absoluteness in the relation between positive pains and actions that are positively injurious, in so far that wherever there is sentiency it exists; yet even here partial relativity may be asserted. For there is no fixed relation between the acting force and the produced feeling. The amount of feeling varies with the size of the organism, with the character of its outer structures, with the character of its nervous system; and also with the temporary states of the part affected, of the body at large, and of the nervous centres.

65. The relativity of pleasures is far more conspicuous, and the illustrations of it furnished by the sentient world at large are innumerable. It needs but to glance round at the various things which different creatures are prompted by their desires to eat and are gratified in eating, to be reminded that the tastes for foods are relative to the structures of the creatures. So is it with the other senses. The receipt of each agreeable sensation depends primarily on the existence of a structure which is called into play; and, secondarily, on the condition of that structure, as fitting it or unfitting it for activity.

66. The truth that emotional pleasures are made possible, partly by the existence of correlative structures and partly by the states of those structures, is equally undeniable. The fact that men's hobbies often appear to their friends ludicrous, might make us see that the pleasurableness of actions of this or that kind, is due not to anything in the natures of the actions but to the existence of faculties which find exercise in them. Each pleasurable emotion, like each pleasurable sensation, is also relative not only to a certain structure but also to the state of that structure—it must be in a condition fit for action.

67. When we have got rid of the tendency to think that certain modes of activity are necessarily pleasurable because

they give us pleasure, and that other modes which do not please us are necessarily unpleasing; we shall see that the re-moulding of human nature into fitness for the requirements of social life, must eventually make all needful activities pleasurable, while it makes displeasurable all activities at variance with these requirements. We shall infer that along with decrease of those emotions for which the social state affords little or no scope, and increase of those which it persistently exercises, the things now done with dislike from a sense of obligation will be done with immediate liking, and the things desisted from as a matter of duty will be desisted from because they are repugnant.

XI. EGOISM *VERSUS* ALTRUISM.

68. That egoism precedes altruism in order of imperativeness is evident. For the acts which make continued life possible, must, on the average, be more peremptory than all those other acts which life makes possible; including the acts which benefit others.

69. Turning from life as existing to life as evolving, we are equally shown this. Sentient beings have progressed from low to high types, under the law that the superior shall profit by their superiority and the inferior shall suffer from their inferiority. Which is to say that egoistic claims must take precedence of altruistic claims.

70. Conformity to this law has been, and is still, needful, not only for the continuance of life but for the increase of happiness; since the superior are those having faculties better adjusted to the requirements—faculties, therefore, which bring in their exercise greater pleasure and less pain.

71. More special considerations join these more general ones in showing this truth. Such egoism as preserves a vivacious mind in a vigorous body furthers the happiness of descendants, whose inherited constitutions make the

labours of life easy and its pleasures keen; while, conversely, unhappiness is entailed on posterity by those who bequeath them constitutions injured by self-neglect.

72. Again, the individual whose well-conserved life shows itself in over-flowing spirits, becomes, by his mere existence, a source of pleasure to all around; while the depression which commonly accompanies ill-health diffuses itself through family and among friends. A further contrast is that whereas one who has been duly regardful of self retains the power of being helpful to others, there results from self-abnegation in excess, not only an inability to help others but the infliction of positive burdens on them.

73. In one further way is the undue subordination of egoism to altruism injurious. Both directly and indirectly unselfishness pushed to excess generates selfishness. For every one can remember circles in which the daily surrender of benefits by the generous to the greedy, has but caused increase of greedinesss; and that pecuniary means spent on others, may, by prohibiting marriage, lead to the altruistic traits not being transmitted to descendants—to increase of selfishness.

74. Finally it may be remarked that a rational egoism, so far from implying a more egoistic human nature, is consistent with a human nature that is less egoistic. For asserting the due claims of self, is, by implication, drawing a limit beyond which the claims are undue; and is, by consequence, bringing into greater clearness the claims of others.

XII. ALTRUISM VERSUS EGOISM.

75. If we define altruism as being all action which, in the normal course of things, benefits others instead of benefiting self, then, from the dawn of life, altruism has been no less essential than egoism. For while, on the one hand, a falling short of normal egoistic acts entails enfeeble-

ment or loss of life, and therefore loss of ability to perform altruistic acts; on the other hand, such defect of altruistic acts as causes death of offspring or inadequate development of them, involves disappearance from future generations of the nature that is not altruistic enough—so decreasing the average egoism. In short, every species is continually purifying itself from the unduly egoistic individuals, while there are being lost to it the unduly altruistic individuals.

76. As there has been an advance by degrees from unconscious parental altruism to conscious parental altruism of the highest kind, so there has been an advance by degrees from the altruism of the family to social altruism. Let us now consider the several ways in which, under social conditions, personal welfare depends on due regard for the welfare of others.

77. Fulness of egoistic satisfactions in the associated state, depending primarily on maintenance of the normal relation between efforts expended and benefits obtained, which underlies all life, implies an altruism which both prompts equitable conduct and prompts the enforcing of equity. The egoistic satisfactions of each depend, in large measure, firstly in being just, secondly in seeing justice done between others, and thirdly in upholding and improving the agencies by which justice is administered.

78. But the identification of personal advantage with the advantage of fellow-citizens is much wider than this. Whatever conduces to their vigour concerns him; for it diminishes the cost of everything he buys. Whatever conduces to their freedom from disease concerns him; for it diminishes his own liability to disease. Whatever raises their intelligence concerns him; for inconveniences are daily entailed on him by others' ignorance or folly. Whatever raises their moral characters concerns him; for at every turn he suffers from the average unconscientiousness.

79. Much more directly do his egoistic satisfactions depend on those altruistic activities which enlist the sympathies of others. By alienating those around, selfishness

loses the unbought aid they can render; shuts out a wide range of social enjoyments; and fails to receive those exaltations of pleasure and mitigations of pain, which come from men's fellow-feeling with those they like.

80. Yet other modes exist in which egoism unqualified by altruism habitually fails. Undue egoism defeats itself by bringing on an incapacity for happiness. Purely egoistic gratifications are rendered less keen by satiety, even in the earlier part of life, and almost disappear in the later; the less satiating gratifications of altruism are missed throughout life, and especially in that latter part when they largely replace egoistic gratifications; and there is a lack of susceptibility to æsthetic pleasures of the higher orders.

81. An indication must be added of the truth, scarcely at all recognized, that this dependence of egoism upon altruism ranges beyond the limits of each society, and tends ever towards universality. That within each society it becomes greater as social evolution, implying increase of mutual dependence, progresses, needs not be shown; and it is a corollary that as fast as the dependence of societies on one another is increased by commercial intercourse, the internal welfare of each becomes a matter of concern to the others.

NOTE.—Of the self-happiness gained by seeking others' happiness, probably the largest amount is that due to the strengthening of the altruistic sentiments and reappearance of these strengthened sentiments in offspring; prompting them to a conduct which makes parenthood a blessing.

XIII. TRIAL AND COMPROMISE.

82. Thus pure egoism and pure altruism are both illegitimate. The necessity for a compromise will be perhaps best shown by stating one of the two claims in its extreme form. Let us take that of pure unselfishness.

83. This commits us to an examination of "the greatest happiness principle" of Bentham and his followers. If

"the greatest happiness of the greatest number," or in other words, "the general happiness," is the proper end of action, then not only for all public action but for all private action, it must be the end; because, otherwise, the greater part of action remains unguided. Consider its fitness for each.

84. If corporate action is to be guided by the principle, with its interpreting comment—"everyone to count for one, nobody for more than one"—there must be an ignoring of all differences of character and conduct, merits and demerits, among citizens, since no discrimination is provided for; and moreover, since that in respect of which all are to count alike cannot be happiness itself, which is indistributable, and since equal sharing of the concrete means to happiness, besides failing ultimately would fail proximately to produce the greatest happiness; it results that equal distribution of the conditions under which happiness may be pursued is the only tenable meaning. The principle is nothing but a roundabout insistance on equity.

85. If, taking happiness at large as the aim of private action, the individual is required to judge between his own happiness and that of others as an impartial spectator would do, we may see that no supposition concerning the spectator save one which suicidally ascribes partiality to him, can bring out any other result than that each shall enjoy such happiness, or appropriate such means to happiness, as his own efforts gain: equity is again the sole content.

86. When, adopting another method, we consider how the greatest sum of happiness may be composed, and, recognizing the fact that equitable egoism will produce a certain sum, ask how pure altruism is to produce a greater sum; we are shown that if all, exclusively pursuing altruistic pleasures, are so to produce a greater sum of pleasures, the implication is that altruistic pleasures, which arise from sympathy, can exist in the absence of egoistic pleasures with which there may be sympathy—an impos-

sibility; and another implication is, that if it is said that the greatest sum of happiness will be attained if all individuals are more altruistic than egoistic, it is indirectly said that as a general truth, representative feelings are stronger than presentative feelings—another impossibility.

87. Further, pure altruism presents this fatal anomaly; that while a right principle of action must be more and more practised as men improve, the altruistic principle becomes less and less practicable as men approach an ideal form, because the sphere for practising it continually decreases.

88. Again, the doctrine of pure altruism assumes that happiness may be to any extent transferred or redistributed; whereas the fact is that pleasures of one order—those which are inseparable from maintenance of the physique in an uninjured state—cannot be transferred in large measure without fatal or extremely injurious results: and that pleasures of another order—those of successful action—cannot be transferred in any degree.

89. In yet one more way may be shown the inconsistency of this transfigured utilitarianism which regards its doctrine as embodying the Christian maxim—"Love your neighbour as yourself," and of that altruism which, going still further, enunciates the maxim—"Live for others." For all to adopt this principle of action, which they must do if it is a sound principle, implies that all are at once extremely unegoistic and extremely egoistic—ready to injure self for others' benefit, and ready to accept benefit at the cost of injury to others: traits which cannot coexist.

90. The need for a compromise between egoism and altruism is thus made conspicuous. We are forced to recognize the claims which his own well-being has on the attention of each by noting how, in some directions we come to a deadlock, in others to contradictions, and in others to disastrous results, if they are ignored. Conversely, it is undeniable that disregard of others by each, carried to a great extent is fatal to society, and carried to a still

greater extent is fatal to the family, and eventually to the race. Egoism and altruism are therefore co-essential.

91. What form is the compromise between egoism and altruism to assume? How are their respective claims to be satisfied in due degrees? It is admitted that self-happiness is, in a measure, to be obtained by furthering the happiness of others. May it not be true that, conversely, general happiness is to be obtained by furthering self-happiness? If the well-being of each unit is to be reached partly through his care for the well-being of the aggregate, is not the well-being of the aggregate to be reached partly through the care of each unit for himself? Clearly, our conclusion must be that general happiness is to be achieved mainly through the adequate pursuit of their own happinesses by individuals; while, reciprocally, the happinesses of individuals are to be achieved in part by their pursuit of the general happiness. A conclusion embodied in the progressing ideas and usages of mankind.

XIV. CONCILIATION.

92. Here it remains to be shown that a conciliation has been, and is, taking place between the interests of each citizen and the interests of citizens at large. Though altruism of a social kind, lacking certain elements of parental altruism, can never attain the same level; yet it may be expected to attain a level at which it will be like parental altruism in spontaneity—a level such that ministration to others' happiness will become a daily need. How will the development of sympathy bring about this state?

93. Gradually, and only gradually, as the various causes of unhappiness become less can sympathy become greater. As the moulding and re-moulding of man and society into mutual fitness progresses, and as the pains caused by unfitness decrease, sympathy can increase in presence of the pleasures that come from fitness. The two changes are indeed so

related that each furthers the other. Such growth of sympathy as conditions permit, itself aids in lessening pain and augmenting pleasure; and the greater surplus of pleasure that results makes possible further growth of sympathy.

94. Two factors have to be considered in the development of sympathy—the natural language of feeling in the being sympathized with, and the power of interpreting that language in the being who sympathizes. If we suppose both a more unrestrained use of the language of the emotions, a more delicate perception of the signs, and a strengthened constructive imagination, we shall get some idea of the deeper and wider sympathy that will hereafter arise.

95. What must be the accompanying evolution of conduct? Unceasing social discipline will so mould human nature, that eventually sympathetic pleasures will be spontaneously pursued to the fullest extent advantageous to each and all. The scope for altruistic activities will not exceed the desire for altruistic satisfactions.

96. The opportunities for that postponement of self to others which constitutes altruism as ordinarily conceived, must, in several ways, be more and more limited as the highest state is approached. In proportion as mankind approach complete adjustment of their natures to social needs, there must be fewer and smaller opportunities for giving aid; for there cannot be a beneficial interference between faculty and function when the two are adjusted. General altruism, in its developed form, must inevitably resist individual excesses of altruism—instead of each maintaining his own claims, others will maintain his claims for him. What spheres, then, will eventually remain for altruism? There are three. The first, which must to the last continue large in extent, is that which family life affords. The other two being pursuit of social welfare at large, and the opportunities afforded by accidents, diseases, and misfortunes.

97. Must it then follow that eventually, with this diminution of the spheres for it, altruism must diminish in total

amount? By no means. What now in the highest natures is occasional and feeble, may be expected with further evolution to become habitual and strong; and what now characterizes the exceptionally high may be expected eventually to characterize all. For that which the best human nature is capable of, is within reach of human nature at large.

98. That these conclusions will meet with any considerable acceptance is improbable. Neither with current ideas nor with current sentiments are they sufficiently congruous. There are some, however, who may think that a rationalized version of these ethical principles will eventually be acted upon.

XV. ABSOLUTE AND RELATIVE ETHICS.

99. If, as implied in the foregoing divisions, the principles of action distinguished as absolute and relative concern the conduct of conditioned beings; in what way are the words to be understood? A criticism on the current conceptions of right and wrong will best explain.

100. A great part of the perplexities in ethical speculation arises from neglect of the distinction between the absolutely right and the relatively right. And many further perplexities are due to the assumption that it can, in some way, be decided in every case which of two courses is morally obligatory.

101. To make clear the distinction between that perfect conduct which is the subject-matter of Absolute Ethics, and that imperfect conduct which is the subject-matter of Relative Ethics, two illustrations must be given.

102. Consider the relation of a healthy mother to a healthy infant. Between the two there exists a mutual dependence which is a source of pleasure to both. In yielding its natural food to the child, the mother receives gratification; and to the child there comes the satisfaction of appetite, furthering life, growth, and enjoyment. Let the

relation be suspended, and on both sides there is suffering. Consequently the act is of the kind we call absolutely right. In contrast, the wearisomeness of productive labour as ordinarily pursued renders it so far wrong; but then far greater suffering would result, both to the labourer and his family, and therefore far greater wrong would be done, were this wearisomeness not borne. The act is relatively right.

103. We have now to recognize the further truth that in many cases where there is no absolutely right course, but only courses that are more or less wrong, it is not possible to say which is the least wrong. For instance, there is a point up to which it is relatively right for a parent to carry self-sacrifice for the benefit of offspring; and there is a point beyond which self-sacrifice cannot be pushed without bringing, not only on himself or herself but also on the family, evils greater than those to be prevented by the self-sacrifice. Who shall say where this point is? Depending on the constitutions and needs of those concerned, it is in no two cases the same, and cannot be by anyone more than guessed.

104. And now we are prepared for dealing with the distinction between Absolute Ethics and Relative Ethics. Scientific truths, of whatever order, are reached by eliminating perturbing or conflicting factors, and recognizing only fundamental factors. When, by dealing with fundamental factors in the abstract, not as presented in actual phenomena but as presented in ideal separation, general laws have been ascertained, it becomes possible to draw inferences in concrete cases by taking into account incidental factors. But it is only by first ignoring these and recognizing the essential elements alone, that we can discover the essential truths sought.

105. Hence the necessary precedence of Absolute Ethics over Relative Ethics. One who has followed the general argument thus far, will not deny that an ideal social being may be conceived as so constituted that his spontaneous activities are congruous with the conditions imposed by the

social environment formed by other such beings. It follows as a necessary implication that there exists an ideal code of conduct formulating the behaviour of the completely adapted man in the completely evolved society. Such a code is that here called Absolute Ethics as distinguished from Relative Ethics—a code the injunctions of which are alone to be considered as absolutely right in contrast with those that are relatively right or least wrong; and which, as a system of ideal conduct, is to serve as a standard for our guidance in solving, as well as we can, the problems of real conduct.

105, *bis.* When, formulating normal conduct in an ideal society, we have reached a science of absolute ethics, we have simultaneously reached a science which, when used to interpret the phenomena of real societies in their transitional states full of the miseries due to non-adaptation, enables us to form approximately true conclusions respecting the natures of the abnormalities, and the courses which tend most in the direction of the normal.

106. To make the ideal man serve as a standard, he has to be defined in terms of the conditions which his nature fulfils—in terms of those objective requirements which must be met before conduct can be right; and the common defect of the conceptions of the ideal man formed by moralists at large, is that they suppose him out of relation to such conditions. We must consider the ideal man as existing in the ideal social state. On the evolution-hypothesis, the two presuppose one another; and only when they coexist, can there exist that ideal conduct which Absolute Ethics has to formulate, and which Relative Ethics has to take as the standard by which to estimate divergences from right, or degrees of wrong.

XVI. THE SCOPE OF ETHICS.

107. When we see what the injunctions of Absolute Ethics must be for the ideal man under the implied ideal

conditions, we shall be prepared to see how such injunctions are to be most nearly fulfilled by actual men under existing conditions.

108. That it will ever be practicable to lay down precise rules for private conduct may be doubted. But the function of Absolute Ethics in relation to private conduct will have been discharged, when it has produced the warrant for its requirements as generally expressed; when it has shown the imperativeness of obedience to them; and when it has thus taught the need for deliberately considering whether the conduct fulfils them as well as may be.

109. Passing to that division of Ethics which, considering exclusively the effects of conduct on others, treats of the right regulation of it with a view to such effects, we find that justice, which formulates the range of conduct and limitations to conduct hence arising, is at once the most important division of Ethics and the division which admits of the greatest definiteness. Though we cannot regard the members of a society as absolutely equal; yet, considering them as approximately equal in virtue of their common human nature, and dealing with questions of equity on this supposition, we may reach conclusions of a sufficiently definite kind.

110. Of the two sub-divisions into which beneficence falls, the negative and the positive, neither can be specialized. But though here Absolute Ethics, by the standard it supplies, does not greatly aid Relative Ethics, yet, as in other cases, it aids somewhat by keeping before consciousness an ideal conciliation of the various claims involved; and by suggesting the search for such compromise among them, as shall not disregard any, but shall satisfy all to the greatest extent practicable.

THE END.

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